St. XAVIER'S CATHOLIC COLLEGE OF ENGINEERING

Chunkankadai, Nagercoil – 629 003.

AUTONOMOUS COLLEGE AFFILIATED TO ANNA UNIVERSITY

ACADEMIC REGULATIONS 2022

B. E. ELECTRICAL AND ELECTRONICS ENGINEERING CURRICULUM

CHOICE BASED CREDIT SYSTEM

Inconsonance to the vision of our College,

An engineering graduate we form would be a person with optimal human development, i.e.

physical, mental, emotional, social and spiritual spheres of personality.

He/she would be also a person mature in relationships, especially knowing how to treat everyone with respect, including persons of complementary gender with equality and gender sensitivity guided by clear and pro-social values.

He would be patriotic and would hold the Indian Constitution and all the precepts it outlays close to his heart and would have a secular spirit committed to safeguard and cherish the multi-cultural, multi-religious and multi-linguistic ethos of Indian Society.

Academically, he/she would be a graduate with a strong engineering foundation with proficient technical knowledge and skills. He would have enough exposure and experience into the ethos of relevant industry and be industry ready to construct a successful career for himself and for the benefit of the society.

He would have been well trained in research methodology and would have established himself as a researcher having taken up many research projects, with sound ethical standards and social relevance. He would be a person with a passion for technical innovations committed to lifelong learning and research.

He would be well prepared and confident to develop ingenuous solutions to the problems people face as an individual and as a team and work for the emancipation of our society with leadership and courage.

Electrical & Electronics Engineering is a growing and one of the challenging disciplines in the field of engineering study. By the technical modernization of the world, it is necessary to understand and use the circuits and computerized devices in electrical & electronic field.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

1.	Build a solid foundation in mathematics, science, engineering and soft skills for diverse career and persistent learning.
2.	Engage in life long process of learning and research to keep themselves abreast of new developments in the field of Electrical and Electronics engineering.
3.	Have an ability to work in Multi-disciplinary Environment.
4.	Practice their profession conforming to ethical values and environmentally friendly policies.
5.	Model, design and develop a system and component or process the same to meet the needs of the society and industry within realistic constraints.

II. PROGRAMME OUTCOMES (POs)

PO#	Graduate Attribute
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

III. PROGRAMME SPECIFIC OUTCOMES (PSOs)

1	Utilize the Technological advancements in the field of modern Power Systems and formulate reliable and feasible solutions towards the eco-friendly and challenging environment.
2	Design and analyze fundamental Electronics and Embedded systems for real-world problems and develop smart products.
3	Apply recent Technology to control Electrical Machines with the aid of solid state devices to enhance energy conservation and sustainability.

PEO's – PO's & PSO's MAPPING:

PEO	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
I	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
II	3	3	3	2	-	-	-	-	-	-	-	2	-	3	2
III	-	-	3	-	-	1	-	1	1	-	-	3		3	-
IV	-	-	3	-	1	2	3	-	-	-	-	-	3	-	3
V	-	-		3	-	-	-	1	1	2	2	1	1	2	2

PROGRAMME ARTICULATION MATRIX

Year	Semester	Course code	PO												PSO		
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
I	I	MA22101	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
		PH22101	2	1	-	-	-	-	-	-	-	-	-	1	-	1	-
		CH22101	3	2	2	1	-	-	2	-	2	-	1	-	-	1	-
		CS22101	3	3	3	3	-	-	-	-	-	-	-	1	-	-	3
		EN22101	-	-	-	-	-	-	-	-	2	2	-	2	-	1	-
		BS22101	3	1	-	-	-	2	2	-	2	1	-	1	-	1	-
		CS22102	3	3	3	3	2	-	-	-	-	-	-	1	1	-	2
		HS22101	3	2	2	1	-	-	2	-	2	-	1	1	-	-	2
		HS22102	1	-	-	-	-	2	2	3	1	1	-	1	1	1	2
	II	MA22201	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
		ES22201	3	2	2	2	-	-	-	-	-	-	-	1	-	1	-
		EE22202	2	1	2	1	-	-	-	-	-	-	-	2	-	2	-
		ME22201	3	1	-	-	-	-	-	-	-	2	-	-	1	2	-
		EN22201	-	-	-	-	-	-	-	-	2	3	-	2	-	1	-
		PH22202	2	1	-	-	-	-	-	-	2	1	-	1	-	1	-
		CH22201	3	-	-	-	-	-	3	-	1	1	-	1	1	-	-
		EE22203	2	1	1	1	-	-	-	-	2	-	-	1	-	2	-
		ES22203	3	-	-	-	-	1	-	-	3	-	-	1	-	1	-
II	III	MA22301	3	2	1	-	-	-	-	-	-	-	-	-	1	-	1
		EE22301	2	2	-	-	-	-	-	-	-	-	-	1	1	-	-
		EE22303	2	2	1	1	-	1	-	-	-	-	-	1	-	1	-
		EE22304	3	3	1	1	-	-	-	-	-	-	-	1	-		1
		EE22302	2	2	1	1	-	-	-	-	-	-	-	1	-	1	-
		EE22305	3	3		1	-	-	-	-	-	-	-		-		1
		SD22302	3	2	2	-	1	1	1	1	2	3	1	2	1	2	-
		AC22301	-	1	1	1	1	1	1	1	1	1	1	1	-	-	-
		HS22301	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	IV	EE22401	2	2	-	1	-	-	-	-	1	-	-	-	-	-	1
		EE22402	3	3	1	1	-	-	1	-	-	-	-	1	-		1
		EE22405	3	1	1	1	-	-	-	-	-	-	-	1	-	2	-
		EE22403	3	2	3	2	-	-	-	-	-	-	-	1	-	1	-
		EE22404	3	2	3	2	-	-	-	-	-	-	-	1	-	1	-
		EE22406	3	3	1	1	-	-	-	-	-	-	-	-	-	-	2
		EE22407	3	3	1	1	-	-	-	-	-	-	-	-	-	-	2
		SD22402	3	2	2	-	1	1	1	1	2	3	1	2	1	2	-
		AC22401	-	-	-	-	-	1	1	1	-	-	-	-	-	-	1

III	V	EE22501	3	3	3	3	-	2	2	3	2	-	-	3	3	2	2
		EE22502	2	2	2	2	2	2	2	2	-	2	2	3	2	2	2
		SD22501	3	2	2	-	2	-	-	-	-	-	-	2	-	1	1
		AC22501	2	2	1	3	3	3	2	2	3	2	2	3	1	2	3
		HS22501	2	2	2	2	2	1	1	-	-	2	-	1	2	2	2
		EE22503	2	2	2	2	2	2	2	2	-	2	2	3	2	2	2
		EE22504	3	2	2	-	2	-	-	-	-	-	-	2	-	1	1
		EE22505	2	2	1	3	3	3	2	2	3	2	2	3	1	2	3
		SD22501	2	2	2	2	2	1	1	-	-	2	-	1	2	2	2
	VI	HS22601	3	1	1	1	1	2	2	3	2	2	2	1	-	2	-
		EE22601	3	3	3	2	-	-	-	2	2	2	2	3	3	-	1
		EE22602	3	3	2	1	-	-	-	-	-	-	-	1	2	2	1
		EE22603	2	1	1	1	3	1	-	3	3	-	2	2	1	1	1
		EE22604	3	2	2	-	2	-	-	-	-	-	-	2	3	1	2
		EE22605	3	2	2	-	2	-	-	-	-	-	-	2	-	1	1
		SD22601	2	2	2	2	2	1	1	-	-	2	-	1	2	2	2
IV	VII	MS22701	-	-	-	-	2	-	-	-	2	-	3	2	3	-	2
		EE22701	3	2	2	-	2	-	-	-	-	-	-	2	-	1	1
		EE22702	-	-	-	-	2	-	-	-	2	-	3	2	3	-	2
		EE22703	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
		SD22701	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	VIII	EE22801	2	2	2	2	2	1	1	1	1	1	-	1	-	-	2

SEMESTER I

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	MA22101	Matrices and Calculus	BSC	3	1	0	4	4
2	PH22101	Engineering Physics	BSC	3	0	0	3	3
3	CH22101	Engineering Chemistry	BSC	3	0	0	3	3
4	CS22101	Problem Solving and Python Programming	ESC	3	0	0	3	3
THEORY COURSES WITH PRACTICAL COMPONENT								
5	EN22101	Communicative English	HSMC	2	0	2	4	3
PRACTICALS								
6	BS22101	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
7	CS22102	Python Programming Laboratory	ESC	0	0	4	4	2
MANDATORY COURSES								
8	IP22101	Induction Programme	-	-	-	-	-	0
9	HS22101	Higher Order Thinking	MC	1	0	0	1	1
10	HS22102	Universal Human Values: Understanding	HSMC	2	0	0	2	2

		Harmony and Ethical Human Conduct						
TOTAL				**17**	**1**	**10**	**28**	**23**

SEMESTER II

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	MA22201	Statistics and Numerical Methods	BSC	3	1	0	4	4
2	ES22201	Basic Civil and Mechanical Engineering	ESC	3	0	0	3	3
3	EE22202	Electric Circuit Analysis	ESC	3	0	0	3	3
4	ME22201	Engineering Graphics	ESC	2	0	2	4	3
5	GE3152	தமிழர் மரபு /Heritage of Tamils	HSMC	1	0	0	1	1
THEORY COURSES WITH PRACTICAL COMPONENT								
6	EN22201	Technical English	HSMC	2	0	2	4	3
7	PH22202	Physics for Electronics Engineering	BSC	2	0	2	4	3
8	CH22201	Environment and Sustainability	BSC	2	0	2	4	3
PRACTICAL								
9	EE22203	Electric Circuit Analysis Laboratory	ESC	0	0	4	4	2
10	ES22203	Engineering Practices Laboratory	ESC	0	0	4	4	2
TOTAL				**18**	**1**	**16**	**35**	**27**

SEMESTER III

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	MA22301	Transforms and Complex Functions	BSC	3	1	0	4	4
2	EE22301	Electromagnetic Fields	PCC	3	0	0	3	3
3	EE22302	Measurements & Instrumentation	PCC	3	0	0	3	3

4	EE22303	DC Machines & Transformers	PCC	3	0	0	3	3
5	GE3252	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HSMC	1	0	0	1	1
THEORY COURSES WITH PRACTICAL COMPONENT								
6	EE22304	Electronic Devices and Circuits	PCC	3	0	2	5	4
PRACTICALS								
7	EE22305	DC Machines & Transformers Laboratory	PCC	0	0	4	4	2
EMPLOYABILITY ENHANCEMENT COURSES								
8	SD22302	Coding Skills and Soft Skills Training – Phase I	EEC	0	0	4	4	2
MANDATORY COURSES								
9	AC22301	Constitution of India	AC	2	0	0	2	0
10	HS22301	Value Education-I	MC	1	0	0	1	0
TOTAL				**19**	**2**	**10**	**30**	**22**

SEMESTER IV

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	EE22401	Generation, Transmission and Distribution	PCC	3	0	0	3	3
2	EE22402	AC Machines	PCC	3	0	0	3	3
3	EE22403	Control Systems	PCC	3	0	0	3	3
THEORY COURSES WITH PRACTICAL COMPONENT								
4	EE22404	Digital Logic Circuits	PCC	3	0	2	5	4
5	EE22405	Linear Integrated Circuits	PCC	3	0	2	5	4
PRACTICALS								
6	EE22406	AC Machines Laboratory	PCC	0	0	4	4	2
7	EE22407	Control & Instrumentation Laboratory	PCC	0	0	4	4	2
EMPLOYABILITY ENHANCEMENT COURSES								
8	SD22402	Coding Skills and Soft Skills Training -Phase II	EEC	0	0	4	4	2

MANDATORY COURSES								
9	AC22401	Industrial Safety Engineering	AC	2	0	0	2	0
TOTAL				**17**	**0**	**16**	**33**	**23**

SEMESTER V

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	EE22501	Renewable Energy Systems	PCC	3	0	0	3	3
2	EE22502	Power Electronics	PCC	3	0	0	3	3
3		Professional Elective - I	PEC	-	-	-	-	3
4		Professional Elective - II	PEC	-	-	-	-	3
THEORY COURSES WITH PRACTICAL COMPONENT								
5	EE22503	Power System Analysis	PCC	3	0	2	5	4
PRACTICALS								
6	EE22504	Power Electronics Laboratory	PCC	0	0	4	4	2
EMPLOYABILITY ENHANCEMENT COURSES								
7	EE22505	Inplant / Industrial Training (2 weeks - During 4th semester Summer Vacation)	EEC	-	-	-	-	1
8	SD22502	Coding Skills and Soft Skills Training -Phase III	EEC	0	0	4	4	2
MANDATORY COURSES								
9	AC22501	Entrepreneurship Development	AC	2	0	0	2	0
10	HS22501	Value Education-II	MC	1	0	0	1	0
TOTAL				**12**	**0**	**10**	**22**	**21**

SEMESTER VI

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								

1	HS22601	Professional Ethics	HSMC	3	0	0	3	3
2	EE22601	Power System Operation and Control	PCC	3	0	0	3	3
3	EE22602	Microprocessor and Embedded Systems	PCC	3	0	0	3	3
4		Open Elective - I	OEC	3	0	0	3	3
5		Professional Elective - III	PEC	-	-	-	-	3
6		Professional Elective - IV	PEC	-	-	-	-	3
PRACTICALS								
7	EE22603	Microprocessor and Embedded Systems Laboratory	PCC	0	0	4	4	2
EMPLOYABILITY ENHANCEMENT COURSES								
8	EE22604	Technical Seminar	EEC	0	0	2	2	1
9	SD22602	Coding Skills, Logical Reasoning and Quantitative Aptitude Training - Phase I	EEC	0	0	4	4	2
TOTAL				**12**	**0**	**10**	**22**	**23**

SEMESTER VII

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	MS22701	Principles of Management	HSMC	3	0	0	3	3
2		Professional Elective- V	PEC	-	-	-	-	3
3		Professional Elective -VI	PEC	-	-	-	-	3
4		Open Elective- II	OEC	3	0	0	3	3
5		Open Elective -III	OEC	3	0	0	3	3
EMPLOYABILITY ENHANCEMENT COURSES								
6	EE22703	Product Development Lab/ Mini Project Work	EEC	0	0	6	6	3
7	SD22702	Coding Skills, Logical Reasoning and Quantitative Aptitude Training -Phase II	EEC	0	0	4	4	2
TOTAL				**9**	**0**	**10**	**19**	**20**

SEMESTER VIII

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
EMPLOYABILITY ENHANCEMENT COURSES								

1	EE22801	Internship/ Project Work	EEC	0	0	16	16	8
TOTAL				**0**	**0**	**16**	**16**	**8**

(TOTAL CREDITS: 167)

SUMMARY

BE Electrical and Electronics Engineering										
SL. No.	**Subject Area**	**Credits per Semester**								**Total Credits**
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	
1	HSMC	5	4	1			3	3		16
2	BSC	12	10	4						26
3	ESC	5	13							18
4	PCC			15	21	12	8	0		56
5	PEC					6	6	6		18
6	OEC						3	6		9
7	EEC			2	2	3	3	5	8	23
8	MC	1		0		0				1
9	AC			x	x	x				x
Total		**23**	**27**	**22**	**23**	**21**	**23**	**20**	**8**	**167**

PROFESSIONAL ELECTIVE COURSES

LIST OF IDENTIFIED VERTICALS	
1	Sustainable Energy Technologies/ Clean and Green Technologies
2	Electric Vehicle Technology
3	Power Engineering
4	Converters and Drives
5	Embedded Systems

VERTICAL 1

SUSTAINABLE ENERGY TECHNOLOGIES/ CLEAN AND GREEN TECHNOLOGIES

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	EE22511	Power Plant Engineering	PEC	3	0	0	3	3
2	EE22512	Solar Energy Systems	PEC	2	0	2	4	3
3	EE22611	Wind Energy Conversion Systems	PEC	2	0	2	4	3
4	EE22612	Hydrogen and Fuel Cell Technologies	PEC	3	0	0	3	3
5	EE22711	Energy Storage System	PEC	2	0	2	4	3
6	EE22712	Grid Integrating Techniques and Challenges	PEC	3	0	0	3	3

VERTICAL 2

ELECTRIC VEHICLE TECHNOLOGY

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	EE22521	Electric Vehicle Architecture	PEC	3	0	0	3	3
2	EE22522	Design of Motor and Power Converters for Electric Vehicles	PEC	3	0	0	3	3
3	EE22621	Electric Vehicle Design, Mechanics and Control	PEC	2	0	2	4	3
4	EE22622	Energy Storage and Management System	PEC	3	0	0	3	3
5	EE22721	Testing of Electric Vehicles	PEC	2	0	2	4	3
6	EE22722	Grid Integration of Electric Vehicles	PEC	3	0	0	3	3

VERTICAL 3

POWER ENGINEERING

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	EE22531	Design of Electrical Apparatus	PEC	3	0	0	3	3
2	EE22532	EHVAC and HVDC Transmission and FACTS	PEC	3	0	0	3	3
3	EE22631	Utilization and Conservation of	PEC	3	0	0	3	3

		Electrical Energy						
4	EE22632	Restructured Power Market	PEC	3	0	0	3	3
5	EE22731	Energy Management and Auditing	PEC	3	0	0	3	3
6	EE22732	High Voltage Engineering	PEC	3	0	0	3	3

VERTICAL 4

CONVERTERS AND DRIVES

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	EE22541	Power Semiconductor Devices and Circuits	PEC	3	0	0	3	3
2	EE22542	Morden Electrical Machines	PEC	3	0	0	3	3
3	EE22641	Electric Power Quality	PEC	3	0	0	3	3
4	EE22642	Electrical Drives	PEC	3	0	0	3	3
5	EE22741	SMPS and UPS	PEC	3	0	0	3	3
6	EE22742	Power Converters for Renewable Energy Systems	PEC	3	0	0	3	3

VERTICAL 5

EMBEDDED SYSTEMS

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	EE22551	Embedded System	PEC	3	0	0	3	3

		Design						
2	EE22552	Digital Signal Processing System	PEC	2	0	2	4	3
3	EE22651	Real Time Operating System	PEC	3	0	0	3	3
4	EE22652	Intelligent Control	PEC	3	0	0	3	3
5	EE22751	Smart Systems	PEC	3	0	0	3	3
6	EE22752	PLC Programming	PEC	3	0	0	3	3

OPEN ELECTIVE TO BE OFFERED TO OTHER DEPARTMENT

OPEN ELECTIVE – I

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	EE22681	Power Plant Engineering	OEC	3	0	0	3	3
2	EE22682	Electric Vehicle	OEC	3	0	0	3	3

OPEN ELECTIVE – II

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	EE22781	Electrical Safety	OEC	3	0	0	3	3
2	EE22782	Electrical Wiring and Lighting	OEC	3	0	0	3	3

OPEN ELECTIVE – III

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	EE22783	Energy Conservation	OEC	3	0	0	3	3
2	EE22784	Smart Grid	OEC	3	0	0	3	3

SYLLABUS

SEMESTER I

MA22101	MATRICES AND CALCULUS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus
- To familiarize the student with functions of several variables. This is needed in many branches of engineering
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications
- To make the students understand various techniques ODE

UNIT I MATRICES **12**

Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors – Problem solving using Cayley-Hamilton method – Orthogonal transformation of a symmetric matrix to Diagonal form – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature, rank, index.

UNIT II DIFFERENTIAL CALCULUS **12**

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules: sum, product, quotient, chain rules - Implicit differentiation – Logarithmic differentiation – Applications: Maxima and Minima of functions of one variable.

UNIT III FUNCTIONS OF SEVERAL VARIABLES **12**

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV MULTIPLE INTEGRALS **12**

Double integrals – Double integrals in Cartesian and polar coordinates –Area enclosed by plane curves - Change of order of integration – Triple integrals – Volume of solids: cube, rectangular parallelopiped.

UNIT V ORDINARY DIFFERENTIAL EQUATIONS **12**

Linear differential equations of second and higher order with constant coefficients when the R.H.S is e^{ax}, x^n , sin ax, cos ax, $e^{ax}x^n$, e^{ax} sinbx, e^{ax} cosbx – Linear differential equations of second and third order with variable coefficients: Cauchy's and Legendre's linear equations – Method of variation of parameter .

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Define the basic concepts of matrices, limit and continuity of a function, differentiation, ODE and integration.
CO2:	Explain the properties of matrices and nature of the quadratic form
CO3:	Interpret the techniques of differentiation, partial differentiation, ODE and integration
CO4:	Apply diagonalization of matrices in quadratic form and apply Cayley Hamilton theorem to find the inverse of matrices
CO5:	Solve problems on differentiation, partial differentiation, integration and ODE using different methods

TEXT BOOKS:	
1	Narayanan, S. and Manicavachagom Pillai, T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, Reprint 2017.
2	Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
REFERENCES:	
1	Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
2	Anton, H, Bivens, I and Davis, S, "Calculus", Wiley, 10th Edition, 2016.
3	Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
4	Kreyszig. E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
5	Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.

Course outcomes MA22101	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO2	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO3	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO4	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO5	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1

Table of Specifications for End Semester Question Paper

MA22101- MATRICES AND CALCULUS

Unit No. and Title	Total 2 Marks Qns.	Total 16 Marks Qns.	Cognitive Level			
			Remember (Re)	**Understand** (Un)	**Apply** (Ap)	**Analyse** (An)
			No. of Qns. (marks) and CO			
Unit-I: Matrices	2	1 either or	1(2)-CO1	1(2)-CO2	1either or (16)-CO4	-
Unit-II: Differential Calculus	2	1 either or	-	2(2)-CO3	1either or (16)-CO5	-
Unit-III: Functions of several variables	2	1 either or	-	2(2)-CO3	1either or (16)-CO5	-
Unit-IV: Multiple integrals	2	1 either or	-	2(2)-CO3	1either or (16)-CO5	-

Unit-V: Ordinary differential equations	2	1 either or	-	2(2)-CO3	1either or (16)-CO5	-
Total Qns.	10	5 either or	1(2)	9(2)	5 either or (16)	-
Total Marks	20	80	2	18	80	-
Weightage	20%	80%	2%	18%	80%	-

Weightage for COs

	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	2	2	16	16	64
Weightage	2%	2%	16%	16%	64%

PH22101	**ENGINEERING PHYSICS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES:

- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology
- To help the students to interrelate the topics such as properties of matter, thermal physics, ultrasonics, quantum theory and crystals, learned in the course
- To motivate students to compare and contrast the available equipment in the respective fields
- To induce the students to design new devices that serve humanity by applying the knowledge gained during the course

UNIT I	**PROPERTIES OF MATTER**	**9**

Elasticity – Types of Elastic moduli – Factors affecting elasticity - Stress-strain diagram and its uses - beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: determination of young's modulus – I shaped Girders - twisting couple - torsion pendulum: determination of rigidity modulus and moment of inertia – torsion springs - other states of matter

UNIT II	**THERMAL PHYSICS**	**9**

Modes of Heat transfer – Thermal conductivity – Newton's law of cooling – Linear heat flow – Thermal conductivity in compound media - Lee's Disc method – Radial heat flow – Rubber tube method – Solar water heater - Thermodynamics – Isothermal and adiabatic process – Otto cycle – Diesel cycle

UNIT III	**ULTRASONICS**	**9**

Sound waves – ultrasonics – properties - production: magnetostriction method - piezoelectric method – cavitation - acoustic grating: wavelength and velocity of ultrasonic waves in liquids – applications: welding, machining, cleaning, soldering and mixing (qualitative) - SONAR – ultrasonic flaw detector - ultrasonography.

UNIT IV	**QUANTUM PHYSICS**	**9**

Black body radiation – Planck's radiation law – Deduction of Wien's displacement law and Rayleigh Jean's law - Compton effect, Photoelectric effect (qualitative) – matter waves – concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box – scanning tunneling microscope.

UNIT V	**CRYSTAL PHYSICS**	**9**

Crystalline and amorphous materials – unit cell, crystal systems, Bravais lattices, Crystal

planes, directions and Miller indices – Characteristics of crystal structures: SC, BCC, FCC and HCP structures - crystal imperfections: point, line and surface defects – crystal growth : epitaxial and lithography techniques	
TOTAL: 45 PERIODS	
COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Recall the basics of properties of matter, thermal physics and ultrasonics, to improve their engineering knowledge.
CO2:	Define the advanced physics concepts of quantum theory and the characteristics of crystalline materials.
CO3:	Illustrate Bending of beams, thermal behavior and ultrasonic devices to assess societal and safety issues.
CO4:	Summarize the dual aspects of matter, crystal structures and imperfections of crystals.
CO5:	Apply the moduli of elasticity of different materials, thermal energy, ultrasonics, scanning tunneling microscope and crystal growth techniques in engineering fields.
TEXT BOOKS:	
1.	Gaur, R.K & Gupta.S.L, Engineering Physics, Dhanpat Rai Publishers, 2016.
2.	Shatendra Sharma & Jyotsna Sharma, Engineering Physics, Pearson India Pvt Ltd., 2018
REFERENCES:	
1.	Halliday.D, Resnick, R. & Walker. J, "Principles of Physics", Wiley, 2015.
2.	Bhattacharya, D.K. & Poonam.T., Engineering Physics, Oxford University Press, 2015.
3.	Pandey.B.K, & Chaturvedi.S, Engineering Physics, Cengage Learning India. 2012.
4.	Malik H K & Singh A K, "Engineering Physics", McGraw Hill Education (India Pvt. Ltd.) 2nd edition 2018.
5.	Serway.R.A. & Jewett, J.W, "Physics for Scientists and Engineers", Cengage Learning India. 2010.

Course outcomes PH22101	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	-	-	-	-	-	-	1	-	1	-
CO2	2	1	-	-	-	-	-	-	-	-	-	1	-	1	-
CO3	2	1	-	-	-	-	-	-	-	-	-	1	-	1	-
CO4	2	1	-	-	-	-	-	-	-	-	-	1	-	1	-
CO5	3	2	-	-	-	-	-	-	-	-	-	1	-	1	-
CO	2	1	-	-	-	-	-	-	-	-	-	1	-	1	-

Table of Specifications for End Semester Question Paper

PH22101 - ENGINEERING PHYSICS

Unit No. and Title	Total 2 Marks Qns.	Total 16 Marks Qns.	Cognitive Level			
			Remember (Re)	Understand (Un)	Apply (Ap)	Analyse (An)
			No. of Qns. (marks) and CO			
UNIT I - Properties Of Matter	2	1 either or	1(2)-CO1	1(2)-CO3	1 either or (16)- CO5	-
UNIT II - Thermal Physics	2	1 either or	1(2)-CO1	1(2)- CO3	1 either or (16)- CO5	-
UNIT III - Ultrasonics	2	1 either or	2(2)- CO1	-	1 either or (16)- CO5	-
UNIT IV - Quantum Physics	2	1 either or	1(2)-CO2	1 (2)- CO4 1either or (16)- CO4	-	- .
UNIT V - Crystal Physics	2	1either or	2(2)-CO2	1 either or (16)- CO4	-	-
Total Qns.	10	5 either or	7(2)	3(2) 2 either or (16)	3 either or (16)	-
Total Marks	20	80	14	38	48	-
Weightage	20%	80%	14%	38%	48%	-

Weightage for COs					
	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	8	6	4	34	48
Weightage	8%	6%	4%	34%	48%

CH22101	**ENGINEERING CHEMISTRY**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES:

- To make the students conversant with water treatment methods and electrochemistry concept
- To gain basic knowledge of corrosion and protection methods
- To understand the basic concepts and synthesis of various engineering materials, nano materials and fuels
- To familiarise the students with the principles, working process and application of energy storage devices

UNIT I	**WATER TREATMENT**	**9**

Water: Sources, impurities - Hardness of water: Types - Estimation of hardness (EDTA method) - Disadvantages of hard water in boilers (Scale, Sludge) – Softening methods: Internal treatment (Calgon, Sodium Aluminate) and External treatment (Demineralisation process). Domestic water treatment – Desalination of brackish water: RO and Solar desalination method.

UNIT II	ELECTROCHEMISTRY AND CORROSION	12
Electrochemical cell – Free energy and emf – Nernst equation and applications – Oxidation and reduction potential – Standard electrodes: Standard Hydrogen electrode, Saturated calomel electrode, Glass electrode – pH measurement – Conductometric titration (acid-base, precipitation) and Potentiometric titrations: Redox titration (Fe^{2+} x $Cr_2O_7^{2-}$). Corrosion – Types: Chemical corrosion and Electrochemical corrosion – Corrosion control methods: Sacrificial anodic and Impressed current Cathodic protection method		
UNIT III	**FUELS AND COMBUSTION**	**8**
Fuels - classification of fuels – Comparison of solid, liquid and gaseous fuel - Solid fuel - coal - analysis of coal (proximate only) – Liquid fuel - Petroleum – Refining of petroleum - manufacture of synthetic petrol (Bergius process) – Biodiesel – preparation, properties and uses. Gaseous fuel – CNG, LPG. Combustion – Calorific value – Types (Gross and Net calorific value) – Dulong's formula – GCV and LCV calculation using Dulong's formula. Flue gas – Analysis of flue gas by Orsat method.		
UNIT IV	**ENERGY STORAGE DEVICES**	**8**
Batteries – Types (Primary and Secondary) - Lead acid battery, Lithium ion battery - Super capacitors – Storage principle, types and examples – Electric vehicle – working principle - Fuel cells – microbial fuel cell and polymer membrane fuel cell. Nanomaterials in energy storage – CNT –Types, properties and applications.		
UNIT V	**ENGINEERING MATERIALS**	**8**
Abrasives – Types: Natural and Artificial – SiC – preparation, properties and uses. Refractories – Types Acidic, Basic, Neutral – Refractoriness, RUL. Cement – Manufacture – Special cement – white cement and water proof cement. Glass – Manufacture, properties and uses		
		TOTAL: 45 PERIODS

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Recall the basic concepts of water softening, nano materials and batteries
CO2:	Summarize the types of corrosion, fuels and energy storage devices
CO3:	Explain the basic principles of electrochemistry and engineering materials
CO4:	Identify suitable methods for water treatment, fuel and corrosion control
CO5:	Apply the knowledge of engineering materials, fuels and energy storage devices for material selection and also in energy sectors

TEXT BOOKS:	
1.	P. C. Jain and Monika Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2015.
2.	S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company LTD, New Delhi, 2015.

REFERENCES:	
1.	Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
2.	Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi 2015.
3.	Sivasankar B. ''Engineering chemistry'', Tata McGraw Hill Publishing company Ltd, New Delhi, 2008.
4.	B.S.Murty, P.Shankar, Baldev Raj, B B Rath and James Murday, '' Text book of nano science and technology'' Universities press.
5.	O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.

Course outcomes CH22101	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	-	-	-	-	-	-	-	1	-	1	-
CO2	3	2	2	1	-	-	-	-	-	-	-	1	-	1	-
CO3	3	2	2	1	-	-	1	-	-	-	-	1	-	1	-
CO4	3	2	2	1	-	-	2	-	-	-	-	1	-	1	-
CO5	3	2	2	1	-	-	2	-	-	-	-	1	-	1	-
CO	3	2	2	1	-	-	2	-	2	-	1	-	-	1	-

Table of Specifications for End Semester Question Paper

CH22101 - ENGINEERING CHEMISTRY

Unit No. and Title	Total 2 Marks Qns.	Total 16 Marks Qns.	Cognitive Level			
			Remember (Re)	**Understand** (Un)	**Apply** (Ap)	**Analyse (An)**
			No. of Qns. (marks) and CO			
UNIT I – Water Treatment	2	1 either or	1(2)-CO1	1(2)-CO2	1 either or (16)- CO4	-
UNIT II - Electrochemistry And Corrosion	2	1 either or		1(2)-CO2 1(2)- CO3 1 either or (16) – CO3	-	-
UNIT III – Fuels And Combustion	2	1 either or		2(2)- CO2	1 either or (16)- CO5	-
UNIT IV – Energy Storage Devices	2	1 either or	1(2)-CO1	1 (2)- CO2	1 either or (16)- CO5	- .
UNIT V – Engineering Materials	2	1 either or	1(2)-CO1	1(2)- CO3 1 either or (16)- CO3	-	-
Total Qns.	10	5 either or	3 (2)	4 (2) 2 either or (16)	3 either or (16)	-
Total Marks	20	80	6	46	48	-
Weightage	20%	80%	6%	46%	48%	-

Weightage for COs					
	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	6	10	36	16	32
Weightage	6%	10%	36%	16%	32%

CS22101	PROBLEM SOLVING AND PYTHON PROGRAMMING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the basics of algorithmic problem solving
- To learn to solve problems using Python conditionals and loops
- To define Python functions and use function calls to solve problems
- To use Python data structures - lists, tuples, and dictionaries to represent complex data

UNIT I	INTRODUCTION TO COMPUTERS AND PROBLEM SOLVING STRATEGIES	9

Introduction- Components and functions of a computer system- Hardware and Software. Problem solving strategies- Program design tools: Algorithms, Flow charts, Pseudo code

UNIT II	DATA TYPES, EXPRESSIONS, STATEMENTS AND CONTROL FLOW	9

Features of Python -Variables and Identifiers – Data types: Numbers, Strings, Boolean, Tuples, List, Dictionary, Sets - Input operation - Comments, Reserved words, Indentation - Operators and Expressions – Type Conversion - Selection / Conditional Branching Statements - Basic Loop Structures / Iterative Statements - Nested Loops – break statement – continue statement – pass statement

UNIT III	FUNCTIONS AND STRINGS	9

Functions: Function Definition, function call- variable scope and lifetime – return statements. Strings: Definition, operations (concatenation, appending, multiply, slicing) - immutability, comparison, iterations, string methods

UNIT IV	LIST, TUPLES AND DICTIONARIES	9

Lists: Access, updating values- nested, cloning- list operations- list methods- looping in list. Tuples: Tuple operations- nested tuple; Dictionaries- Creating, Accessing, adding, modifying, deleting items

UNIT V	FILES, EXCEPTIONS AND PACKAGES	9

Files: Types of files, Opening and closing Files, Reading and writing files, File positions, Renaming and deleting files. Exceptions: Errors and exceptions, Handling exceptions, Packages

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Describe the algorithmic solutions to simple and complex computational problems
CO2:	Apply functions, modules and packages in Python program and use conditionals and loops for solving problems
CO3:	Analyze conditional branching statements
CO4:	Evaluate python programs
CO5:	Develop programs using compound data types and files

TEXT BOOKS:

1.	Reema Thareja, "Python Programming Using Problem Solving Approach", 13th Edition, Oxford University Press, 2022.
2.	Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.

REFERENCES:	
1.	Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.
2.	Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
3.	John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press, 2021.
4.	Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5.	Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

Course outcomes CS22101	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	-	-	-	-	-	-	-	-	-	-	3
CO2	3	2	2	2	-	-	-	-	-	-	-	-	-	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	1	-	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	1	-	-	3
CO5	3	3	3	3	-	-	-	-	-	-	-	1	-	-	3
CO	3	3	3	3	-	-	-	-	-	-	-	1	-	-	3

Table of Specification for End Semester Question Paper

CS22101 PROBLEM SOLVING AND PYTHON PROGRAMMING

Unit No. and Title	Total 2 Marks Qns.	Total 16 Marks Qns.	Cognitive Level					
			Remember (Re)	Understand (Un)	Apply (Ap)	Analyse (An)	Evaluate (Ev)	Create (Cr)
			No. of Qns. (marks) and CO					
Unit-I: Introduction to Computers and Problem Solving Strategies	2	1 either or	1(2)-CO1	1(2)-CO1 1 either or (16)- CO1	-	-	-	-
Unit-II: Data Types, Expressions, Statements and Control Flow	2	1 either or	1(2)-CO2	1(2)-CO2	-	1 either or (16)- CO3	-	-

Unit-Ill: Functions and Strings	2	1 either or	1(2)- CO3	1(2)- CO3	1 either or (16)-CO2	-	-	-
Unit-IV: List, Tuples and Dictionaries	2	1 either or	1(2)-CO4	1(2)-CO4	-	-	1 either or (16)-CO4	-
Unit-V: Files, Exceptions and Packages	2	1 either or	1(2)-CO5	1(2)-CO5	-	-	-	1 either or (16)-CO5
Total Qns.	10	5 either or	5(2)	5(2) 1 either or (16)	1 either or (16)	1 either or (16)	1 either or (16)	1 either or (16)
Total Marks	20	80	10	26	16	16	16	16
Weightage	20%	80%	10%	26%	16%	16%	16%	16%

Weightage for COs

	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	20	20	20	20	20
Weightage	20%	20%	20%	20%	20%

EN22101	**COMMUNICATIVE ENGLISH**	**L**	**T**	**P**	**C**
		2	**0**	**2**	**3**

COURSE OBJECTIVES:

- To guide the learners on the basics of language including vocabulary and grammar
- To develop the receptive skills of the learners: Reading and Listening
- To develop the productive skills of the learners: Writing and Speaking
- To make the learners realize the importance of accuracy and fluency
- To help the learners use the language in real situations

UNIT I **VOCABULARY AND LANGUAGE STUDY** **6**

Vocabulary – Synonyms and Antonyms, Word building – Prefixes and Suffixes – Word formation- Definitions - One word substitutes - Reading for vocabulary and language development- Note making and Summarizing - Developing Hints.

UNIT II **READING AND LANGUAGE DEVELOPMENT** **6**

Parts of speech, Types of sentences – Statement, Interrogative, Imperative, Exclamatory, Wh-questions, **Yes** or **No** questions and tag questions, Formal Letters – Academic, Official, and Business Letters

UNIT III **GRAMMAR AND LANGUAGE DEVELOPMENT** **6**

Tense and Voice, Auxiliary verbs (be, do, have), Modal verbs - *Types of Reading* : Intensive Reading and Extensive Reading- *Strategies*: Predicting- Skimming and Scanning -Reading for facts - Understanding the parts of paragraph- Learning the transitional signals used in the passage to classify the text

UNIT IV	FUNDAMENTALS OF WRITING	6
Punctuation and Capitalization- **Sentence formation**: Word order-Completion of sentences-Conjunctions-Transitional signals- sentence and sentence structures- Informal Letters.		
UNIT V	**EXTENDED WRITING**	**6**
Degrees of Comparison – Reported speech **-Paragraph writing**-Topic sentence, supporting sentences and concluding sentence-Informal and Formal expressions		
		TOTAL : 30 PERIODS
PRACTICAL EXERCISES		
Listening (Receptive skill**)** *Intensive Listening: Effective and Attentive Listening*		
Exercises		
1) Listening for gist from recorded speeches		
2) Listening for specific information from recorded conversations		
3) Listening for strengthening vocabulary skills.		
4) Listening to variety of situations and voices- Listening for language development		
5) Listening for pronunciation: syllables, stress and intonation.		
Speaking (Productive Skill)		
Exercises		
1) Introducing oneself and others		
2) Asking for / giving personal information		
3) Practicing dialogues in pairs		
4) Giving directions-Informal and formal dialogues		
5) Speaking in connected speech		
6) Responding to questions		
7) Short presentations		
8) Speaking in small and big groups		
9) Learning and practicing the essential qualities of a good speaker		
		TOTAL: 30 PERIODS
		TOTAL(T+P): 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Apply and practice the correct usages of language
CO2:	Receive the language effectively and meaningfully through receptive skills
CO3:	Produce the language appropriate to the needs and situations exercising productive skills
CO4:	Transfer or interpret any piece of information with accuracy and fluency
CO5:	Apply the language intellectually and confidently

TEXT BOOKS:

1.	Shobha. K.N, Rayen, Joavani, Lourdes, "Communicative English", Cambridge University, Press, 2018.
2.	Sudharshana.N.P and Saveetha. C, "English for Technical Communication", Cambridge University Press: New Delhi, 2016.

REFERENCES:	
1.	Kumar, Suresh. E., "Engineering English", Orient Blackswan, Hyderabad, 2015.
2.	Means, L. Thomas and Elaine Langlois, "English & Communication for Colleges", Cengage Learning, USA: 2007.
3.	Greendaum, Sydney and Quirk, Randolph, "A Student's Grammar of the English Language", Pearson Education.
4.	Wood F.T, "Remedial English Grammar", Macmillan, 2007.
5.	Kumar, Sanjay and Pushp Lata, "Communication Skills: A Workbook", New Delhi: OUP, 2018

Course outcomes EN22101	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	1	1	-	2	-	1	-
CO2	-	-	-	-	-	-	-	-	2	3	-	2	-	1	-
CO3	-	-	-	-	-	-	-	-	1	1	-	2	-	1	-
CO4	-	-	-	-	-	-	-	-	2	2	-	2	-	1	-
CO5	-	-	-	-	-	-	-	-	2	3	-	2	-	1	-
CO	-	-	-	-	-	-	-	-	2	2	-	2	-	1	-

Table of Specifications for End Semester Question Paper

EN22101 COMMUNICATIVE ENGLISH

Unit No. and Title	Total 2 Marks Qns.	Total 16 Marks Qns.	Cognitive Level		
			Remember (Re)	**Understand** (Un)	**Apply** (Ap)
			No. of Qns. (marks) and CO		
Unit-I: Vocabulary and Language Study	2	1 compulsory	2(2)-CO1	1 Compulsory (16)- CO1	-
Unit-II: Reading and Language Development	2	1 either or	2(2) - CO2	1 either or (16) - CO2	-
Unit-Ill: Grammar and Language Development	2	1 either or	1(2) - CO3	1(2) - CO3	1either or (16) - CO3
Unit-IV: Fundamentals of Writing	2	1 either or	1(2) - CO4	1(2) - CO4	1either or (16) - CO4

Unit-V: Extended writing	2	1 either or	1(2)-CO5	1(2)-CO5	1 either or (16)- CO5
Total Qns.	10	1 Compulsory & 4 either or	7(2)	3(2) 1 Compulsory &1 either or (16)	3 either or (16)
Total Marks	20	80	14	38	48
Weightage	20%	80%	14%	38%	48%

Weightage for COs

	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	20	20	20	20	20
Weightage	20%	20%	20%	20%	20%

BS22101	**PHYSICS AND CHEMISTRY LABORATORY**	**L**	**T**	**P**	**C**
		0	**0**	**4**	**2**

PHYSICS LABORATORY

OBJECTIVES:

- To learn the proper use of various kinds of physics laboratory equipment.
- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.
- To make the student an active participant in each part of all lab exercises.

LIST OF EXPERIMENTS

1.	Non-uniform bending – Determination of Young's modulus.
2.	SHM of Cantilever – Determination of Young's modulus.
3.	Poiseuille's flow – Coefficient of viscosity of liquid
4.	Torsional pendulum - Determination of Rigidity modulus.
5.	Newton's ring – Radius of curvature of convex lens.
6.	Lee's Disc – Determination of coefficient of thermal conductivity of bad conductor.

TOTAL: 30 PERIODS

CHEMISTRY LABORATORY

OBJECTIVES

- To inculcate experimental skills to test basic understanding of water quality parameters such as, acidity, alkalinity and hardness.
- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.

LIST OF EXPERIMENTS

1.	Determination of total hardness of water by EDTA method.
2.	Conductometric titration of strong acid and strong base.
3.	Determination of strength of given hydrochloric acid using pH meter.

4.	Conductometric precipitation titration using $BaCl_2$ and Na_2SO_4.
5.	Determination of alkalinity in water sample.
6.	Estimation of iron content of the given solution using potentiometer.
	TOTAL: 30 PERIODS
	TOTAL: 60 PERIODS

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Determine different moduli of elasticity used in day to day engineering applications
CO2:	Calculate the viscosity of liquids and radius of curvature of convex lens
CO3:	Estimate the coefficient of thermal conductivity of bad conductors
CO4:	Determine the water quality parameters of the given water sample.
CO5:	Analyze quantitatively the metals (Fe, Ni,) in the any sample volumetrically as well as by using spectro-analytical methods.

Course outcomes BS22101	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	-	-	-	2	1	-	1	-	1	-
CO2	3	1	-	-	-	-	-	-	2	1	-	1	-	1	-
CO3	3	1	-	-	-	-	-	-	2	1	-	1	-	1	-
CO4	3	1	-	-	-	2	2	-	1	-	-	-	-	1	-
CO5	3	1	-	-	-	2	2	-	1	-	-	-	-	1	-
CO	3	1	-	-	-	2	2	-	2	1	-	1	-	1	-

CS22102	**PYTHON PROGRAMMING LABORATORY**	**L**	**T**	**P**	**C**
		0	**0**	**4**	**2**

COURSE OBJECTIVES:
• To understand the problem solving approaches
• To learn the basic programming constructs in Python
• To practice various computing strategies for Python-based solutions to real world problems
• To use Python data structures – lists, tuples, dictionaries
• To do input/output with files in Python
LIST OF EXPERIMENTS:
1. Identification and solving of simple real life or scientific or technical problems, and developing algorithms and flow charts for the same
2. Python programming using simple statements and expressions

3. Scientific problems using Conditionals and Iterative loops	
4. Implementing real-time/technical applications using Lists, Tuples	
5. Implementing real-time/technical applications using Sets, Dictionaries	
6. Implementing programs using Functions	
7. Implementing programs using Strings	
8. Implementing real-time/technical applications using File handling	
9. Implementing real-time/technical applications using Exception handling	
10. Exploring Pygame tool	
11. Developing a game activity using Pygame like bouncing ball	
TOTAL: 60 PERIODS	
COURSE OUTCOMES:	
Upon completion of the course, the students will be able to	
CO1:	Develop algorithmic solutions to simple computational problems
CO2:	Develop and execute simple Python programs
CO3:	Implement programs in Python using conditionals, loops and functions for solving problems
CO4:	Process compound data using Python data structures
CO5:	Utilize Python packages in developing software applications

Course outcomes CS22102	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	-	-	-	-	-	-	-	-	1	-	2
CO2	3	2	2	2	-	-	-	-	-	-	-	-	1	-	2
CO3	3	3	3	3	-	-	-	-	-	-	-	-	1	-	2
CO4	3	3	3	3	-	-	-	-	-	-	-	1	1	-	2
CO5	3	3	3	3	2	-	-	-	-	-	-	1	1	-	2
CO	3	3	3	3	2	-	-	-	-	-	-	1	1	-	2

HS22101	**HIGHER ORDER THINKING**	**L**	**T**	**P**	**C**
		1	**0**	**0**	**1**

COURSE OBJECTIVES:

- Teaching the students the sources and dynamics of thinking.
- Teaching the students the basics of systematic and scientific thinking.
- Initiating the students into critical thinking and to use critical thinking in practical life
- Initiating students into creative thinking

UNIT I	**INTRODUCTION TO COGNITION, KNOWLEDGE AND THINKING**	**3**

Cognition - Different Cognitive functions - Cognition and intelligence - Cognitive development: till adolescence and post adolescence - possibility of true knowledge - The sources of Knowledge. Sensation, perception. Reality of perception - Concept formation, abstraction. Memory and retrieving - Introduction to thinking and types of thinking. Systematic thinking

UNIT II	**LOGIC AND REASONING**	**3**
Commonsense and scientific knowledge. Pursuit of truth.- Syllogistic Logic. Greek and Indian. -Exercises		
UNIT III	**CRITICAL THINKING SKILLS AND DISPOSITIONS**	**3**
Critical Thinking Skills & Dispositions. Critical Thinking Exercises		
UNIT IV	**ANALYSIS OF ARGUMENTS**	**3**
Propositions and fallacies. - Analyzing arguments. - Exercises.		
UNIT V	**CREATIVE THINKING AND INNOVATIVE THINKING**	**3**
Evolution of Scientific Thinking and Paradigm Shift. - Dynamics of Thoughts: Hegel. - Convergent thinking and divergent thinking (out of the box thinking). - Problem solving and Planning.		
		TOTAL: 15 PERIODS

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Demonstrate the sources of knowledge and the process of thinking
CO2:	Demonstrate critical thinking skills and dispositions of critical thinking
CO3:	Confidently engage in creative thinking and problem solving
REFERENCES:	
1	Introduction to Logic, Irving M. Copi, Carl Cohen and Kenneth McMahon, Fourteenth Edition, Pearson Education Limited, 2014.
2	Teaching Thinking Skills: Theory and Practice, Joan Boykoff Baron and Robert J. Sternberg, W.H. freeman and Company, New York.
3	Cognitive Psychology, Robert J. Sternberg, Third Edition, Thomson Wadsworth, UK

Course outcomes HS22101	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	-	-	-	-	-	-	-	1	-	-	2
CO2	3	2	2	1	-	-	-	-	-	-	-	1	-	-	2
CO3	3	2	2	1	-	-	1	-	1	-	1	1	-	-	2
CO	3	2	2	1	-	-	2	-	2	-	1	1	-	-	2

Table of Specifications for End Semester Question Paper

HS22101- HIGHER ORDER THINKING

Unit No. and Title	Total 2 Marks Qns.	Total 16 Marks Qns.	Cognitive Level			
			Remember (Re)	Understand (Un)	Apply (Ap)	Analyse(An) Evaluate(Ev)
UNIT-I: Introduction To Cognition, Knowledge And Thinking	2	1either or	2(2)-CO1	1either or (16) - CO1	-	-
UNIT-II: Logic And Reasoning	2	1either or	2(2)-CO1	1either or (16) - CO1	-	-

UNIT-III: Critical Thinking Skills And Dispositions	2	1either or	2(2)-CO2	1either or (16) - CO2	-	-
UNIT-IV: Analysis Of Arguments	2	1either or	2(2)-CO2	1either or (16) - CO2	-	-
UNIT-V: Creative Thinking And Innovative Thinking	2	1either or	2(2)-CO3	-	1either or (16)-CO3	-
Total Qns.	10	5 either or	10 (2)	4 either or (16)	1 either or (16)	
Total Marks	20	80	20	64	16	
Weightage	20%	80%	20%	64%	16%	
Weightage for Cos						
	CO1	**CO2**	**CO3**			
Total Marks	40	40	20			
Weightage	40%	40%	20%			

HS22102	**UNIVERSAL HUMAN VALUES: UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**2**

COURSE OBJECTIVES:

- To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
- To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
- To create an awareness on Engineering Ethics and Human Values.
- To understand social responsibility of an engineer.

UNIT I	**INTRODUCTION TO VALUE EDUCATION**	**6**

Value Education - Definition, Concept and Need for Value Education, Basic Guidelines - The Content and Process of Value Education - Basic Guidelines for Value Education - Self exploration as a means of Value Education - Happiness and Prosperity as parts of Value Education.

UNIT II	**HARMONY IN THE HUMAN BEING**	**6**

Human Being is more than just the Body- Harmony of the Self ('I') with the Body - Understanding Myself as Co-existence of the Self and the Body - Understanding Needs of the Self and the needs of the Body - Understanding the activities in the Self and the activities in the Body.

UNIT III	**HARMONY IN THE FAMILY, SOCIETY AND HARMONY IN THE NATURE**	**6**

Family as a basic unit of Human Interaction and Values in Relationships - The Basics for Respect and today's Crisis: Affection, Guidance, Reverence, Glory, Gratitude and Love - Comprehensive Human Goal: The Five Dimensions of Human Endeavour - Harmony in Nature: The Four Orders in Nature - The Holistic Perception of Harmony in Existence.

UNIT IV	SOCIAL ETHICS	6
The Basics for Ethical Human Conduct - Defects in Ethical Human Conduct - Holistic Alternative and Universal Order - Universal Human Order and Ethical Conduct - Human Rights violation and Social Disparities.		
UNIT V	**PROFESSIONAL ETHICS**	**6**
Universal Human Values - Value based Life and Profession - Professional Ethics and Right Understanding - Competence in Professional Ethics - Issues in Professional Ethics – The Current Scenario - Vision for Holistic Technologies - Production System and Management Models.		
		TOTAL: 30 PERIODS

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Illustrate the significance of value inputs in a classroom and start applying them in their life and profession.
CO2:	Explain the role of a human being in ensuring harmony in society and nature.
CO3:	Demonstrate the value of harmonious relationship based on trust and respect in their life and profession.
CO4:	Compare values, skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
CO5:	Classify ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

TEXT BOOKS:	
1	R R Gaur, R Sangal, G P Bagaria, "Human Values and Professional Ethics", Excel Books, New Delhi, 2010.
2	A.N. Tripathy, "Human Values", New Age International Publishers, New Delhi, 2004.

REFERENCES:	
1.	Gaur. R.R., Sangal. R, Bagaria. G.P, "A Foundation Course in Value Education", Excel Books, 2009.
2.	Gaur. R.R., Sangal. R, Bagaria. G.P, "Teachers Manual" Excel Books, 2009.
3.	Gaur R R, R Sangal, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2009.
4.	William Lilly, "Introduction to Ethic" Allied Publisher.
5.	Nagarajan, R.S., Professional Ethics and Human values, New Age International Publishers, 2006.

Course outcomes HS22102	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	2	2	3	1	1	-	1	1	1	2
CO2	1	-	-	-	-	2	2	3	1	1	-	1	1	1	2
CO3	1	-	-	-	-	2	2	3	1	1	-	1	1	1	2
CO4	1	-	-	-	-	2	2	3	1	1	-	1	1	1	2
CO5	1	-	-	-	-	2	2	3	1	1	-	1	1	1	2
CO	1	-	-	-	-	2	2	3	1	1	-	1	1	1	2

Table of Specifications for End Semester Question Paper

HS22102 - UNIVERSAL HUMAN VALUES: UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT

Unit No. and Title	Total 2 Marks Qns.	Total 16 Marks Qns.	Cognitive Level			
			Remember (Re)	Understand (Un)	Apply (Ap)	Analyse(An) Evaluate(Ev)
UNIT-I: Introduction To Value Education	2	1either or	2(2) - CO1	1either or (16) - CO1	-	-
UNIT-II: Harmony In The Human Being	2	1either or	2(2) - CO2	1either or (16) - CO2	-	-
UNIT-III: Harmony In The Family, Society And Harmony	2	1either or	1(2) - CO3	1(2) - CO3 1either or (16) - CO3	-	-
UNIT-IV: Social Ethics	2	1either or	1(2) - CO4	1(2) - CO4	1either or (16) - CO4	-
UNIT-V: Professional Ethics	2	1either or	1(2) - CO5	1(2) - CO5	1either or (16) - CO5	-
Total Qns.	10	5either or	7 (2)	3 (2) 3 either or (16)	2 either or (16)	-
Total Marks	20	80	14	54	32	
Weightage	20%	80%	14%	54%	32%	
Weightage for Cos						
	CO1	**CO2**	**CO3**	**CO4**	**CO5**	
Total Marks	20	20	20	20	20	
Weightage	20%	20%	20%	20%	20%	

SEMESTER II

MA22201	STATISTICS AND NUMERICAL METHODS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To provide the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.

- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various numerical methods of solving ordinary differential equations.

UNIT I	**TESTING OF HYPOTHESIS**	**12**

Statistical hypothesis -Type I and Type II errors - Large sample tests based on Normal distribution for single mean and difference of means -Tests based on t distribution for single mean and equality of means - Test based on F distribution for equality of variances - Chi square test for single variance and goodness of fit - Independence of attributes - Contingency table : Analysis of r × c tables.

UNIT II	**DESIGN OF EXPERIMENTS**	**12**

General principles – Analysis of variance (ANOVA) - One way classification - Completely randomized design (CRD) – Two way classification - Randomized block design (RBD) – Three way classification -Latin square design(LSD) – Two factor experiments: 2^2 factorial design

UNIT III	**NUMERICAL SOLUTION OF EQUATIONS**	**12**

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method - Solution of linear system of equations - Gauss elimination method - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel .

UNIT IV	**INTERPOLATION, NUMERICAL DIFFERENTIATION AND INTEGRATION**	**12**

Newton's forward and backward interpolation – Interpolation with unequal intervals - Lagrange's interpolation- Divided differences - Newton's divided difference - Approximation of derivates using interpolation polynomials – Numerical integration using Trapezoidal and Simpson's 1/3, 3/8 rules- Numerical double integration: Trapezoidal and Simpson's rules.

UNIT V	**NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS**	**12**

Single step methods : Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order equations - Multi step methods : Milne's and Adams - Bash forth predictor corrector methods for solving first order equations.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Define the basic concepts of statistical tests, ANOVA, iterative methods, interpolations and ODE.
CO2:	Discuss the techniques of statistical tests and design of experiments.
CO3:	Explain the solution of equations, ODE, single and multistep methods, interpolations, differentiation and integration.
CO4:	Apply the concept of testing of hypothesis and design of experiment in real life.
CO5:	Apply numerical techniques in system of equations, differential equations, interpolation, differentiation and integration.

TEXT BOOKS:

1.	Grewal. B.S. and Grewal. J.S., "Numerical Methods in Engineering and Science ", 10th Edition, Khanna Publishers, New Delhi, 2015.
2.	Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2016.

REFERENCES:	
1.	Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2.	Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3.	Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 2006.
4.	Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics, 4th Edition, Tata McGraw Hill Edition, 2012.
5.	Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2012.

Course outcomes MA22201	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO2	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO3	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO4	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO5	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1

Table of Specifications for End Semester Question Paper

MA22201- STATISTICS AND NUMERICAL METHODS

Unit No. and Title	Total 2 Marks Qns.	Total 16 Marks Qns.	Cognitive Level			
			Remember (Re)	**Understand** (Un)	**Apply** (Ap)	**Analyse** (An) **Evaluate**(Ev)
			No. of Qns. (marks) and CO			
UNIT-I: Testing Of Hypothesis	2	1 either or	1(2)-CO1	1(2)-CO2	1either or (16)-CO4	-
UNIT-II: Design Of Experiments	2	1 either or	2(2)-CO1	-	1either or (16)-CO4	-
UNIT-III: Numerical Solution of Equations	2	1 either or	1(2)-CO1	1(2)-CO3	1either or (16)-CO5	-
UNIT-IV: Interpolation, Numerical Differentiation And Integration	2	1 either or	1(2)-CO1	1(2)-CO3	1either or (16)-CO5	-

UNIT-V: Numerical Solution of Ordinary Differential Equations	2	1 either or	1(2)-CO1	1(2)-CO3	1either or (16)-CO5	-
Total Qns.	10	5 either or	6(2)	4(2)	5 either or (16)	-
Total Marks	20	80	12	8	80	-
Weightage	20%	80%	12%	8%	80%	-

Weightage for COs

	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	12	2	6	32	48
Weightage	12%	2%	6%	32%	48%

ES22201	**BASIC CIVIL AND MECHANICAL ENGINEERING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES:

- To provide the students an illustration of the significance of the Civil and Mechanical Engineering Profession in satisfying the societal needs
- To help students acquire knowledge in the basics of surveying and the materials used for construction
- To provide an insight to the essentials of components of a building and the infrastructure facilities
- To explain the component of power plant units and detailed explanation to IC engines their Working principles
- To explain the Refrigeration & Air-conditioning system.

UNIT I	**PART A: OVERVIEW OF CIVIL & MECHANICAL ENGINEERING**	**9**

Civil Engineering contributions to the welfare of Society - Specialized sub disciplines in Civil Engineering – Structural, Construction, Geotechnical, Environmental, Transportation and Water Resources Engineering – National building code – terminologists: Plinth area, Carpet area, Floor area, Buildup area, Floor space index - Types of buildings: Residential buildings, Industrial-buildings.

Overview of Mechanical Engineering - Mechanical Engineering Contributions to the welfare of Society –Specialized sub disciplines in Mechanical Engineering – Manufacturing, Automation, Automobile and Energy Engineering - Interdisciplinary concepts in Mechanical Engineering.

UNIT II	**SURVEYING AND CIVIL ENGINEERING MATERIALS**	**9**

Surveying: Objects – Classification – Principles – Measurements of Distances and angles – Leveling – Determination of areas– Contours. Civil Engineering Materials: Bricks – Stones – Sand – Cement – Concrete – Steel - Timber – Modern Materials, Thermal and Acoustic Insulating Materials, Decorative Panels, Water Proofing Materials. Modern uses of Gypsum, Pre-fabricated Building component (brief discussion only)

UNIT III	BUILDING COMPONENTS AND INFRASTRUCTURE	9
Building plans – Setting out of a Building - Foundations: Types of foundations - Bearing capacity and settlement – Brick masonry – Stone Masonry – Beams – Columns – Lintels – Roofing – Flooring –Plastering. Types of Bridges and Dams – Water Supply Network - Rain Water Harvesting – Solid Waste Management - Introduction to Highways and Railways - Introduction to Green Buildings.		
UNIT IV	**POWER PLANTS AND INTERNAL COMBUSTION ENGINES**	**9**
Classification of Power Plants- Working principle of steam, Gas, Diesel, Hydro -electric and Nuclear Power plants- Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines.		
UNIT V	**REFRIGERATION AND AIR CONDITIONING SYSTEM**	**9**
Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner. Properties of air - water mixture, concepts of psychometry and its process.		
	TOTAL: 45 PERIODS	

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Explain the profession of Civil and Mechanical Engineering.
CO2:	Summarize the planning of building, infrastructure and working of Machineries.
CO3:	Describe the importance, objectives and principles of surveying.
CO4:	Illustrate the working principle of IC Engines and Power Plants
CO5:	Explain the principles of Refrigeration and Air Conditioning

TEXT BOOKS:	
1.	G Shanmugam, M S Palanichamy, Basic Civil and Mechanical Engineering, McGraw Hill Education; First edition, 2018

REFERENCES:	
1.	Palanikumar, K. Basic Mechanical Engineering, ARS Publications, 2018.
2.	Ramamrutham S., "Basic Civil Engineering", Dhanpat Rai Publishing Co.(P) Ltd, 2013.
3.	Seetharaman S., "Basic Civil Engineering", Anuradha Agencies, 2005.
4.	Shantha Kumar SRJ., "Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai, 2000.

Course outcomes ES22201	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	-	-	-	-	-	-	-	-	1	1	-	-
CO2	2	1	1	-	-	-	-	-	-	-	-	1	1	-	-
CO3	2	1	1	-	-	-	-	-	-	-	-	1	1	-	-
CO4	2	1	1	-	-	-	-	-	-	-	-	1	1	-	-
CO5	2	1	1	-	-	-	-	-	-	-	-	1	1	-	-
CO	2	1	1	-	-	-	-	-	-	-	-	1	1	-	-

Table of Specifications for End Semester Question Paper

ES22201- BASIC CIVIL AND MECHANICAL ENGINEERING

Unit No. and Title	Total 2 Marks Qns.	Total 16 Marks Qns.	Cognitive Level			
			Remember (Re)	Understand (Un)	Apply (Ap)	Analyse(An) Evaluate(Ev)
			No. of Qns. (marks) and CO			
UNIT I	2	1 either or	2(2) – CO1	1 either or(16) –CO1	-	-
UNIT II -	2	1 either or	2(2) - CO2	1 either or(16) –CO2	-	-
UNIT III –	2	1 either or	2(2)-CO3	1 either or(16) –CO3	-	-
UNIT IV –	2	1 either or	2(2) - CO4	1 either or(16) –CO4	-	-
UNIT V –	2	1 either or	2(2) -CO5	1 either or (16) - CO5	-	-
Total Qns.	10	5 either or	10(2)	1 either or (16)	-	-
Total Marks	20	80	20	80	-	-
Weightage	20 %	80%	20%	80%	-	-

Weightage for COs					
	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	20	20	20	20	20
Weightage	20%	20%	20%	20%	20%

EE22202	**ELECTRIC CIRCUIT ANALYSIS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES:

- To introduce electric circuits and its analysis.
- To impart knowledge on solving circuit equations using network theorems.
- To introduce the phenomenon of Resonance and Coupled Circuits.
- To educate on obtaining the transient response of circuits.
- To introduce Phasor diagrams and analysis of single &three phase circuits.

UNIT I	**DC AND AC CIRCUITS**	**12**

DC Circuits: Circuit elements and Kirchhoff's Laws, Current and Voltage Division, Series Resistance, Parallel Resistance, Power in series and parallel Circuits. AC Circuits: Alternating Current and Voltages, Complex Circuits, Power, Power Factor, Impedance. Source transformation, Mesh and Nodal Analysis.

UNIT II	**NETWORK THEOREMS**	**9**

Network Reduction, Star-Delta Transformation, AC and DC Analysis of Superposition Theorem, Thevenin's Theorem, Norton's Theorem and Maximum Power Transfer theorem.

UNIT III	**RESONANCE AND COUPLED CIRCUITS**	**9**

Resonance Circuits: Series and Parallel Resonance, Frequency Response, Bandwidth, Q

Factor. Coupled Circuits: Mutual Inductance, Dot Convention, Coefficient of Coupling, Ideal Transformer, Series Connection of Coupled Inductors, Parallel Connection of Coupled Coils, Tuned Circuits.		
UNIT IV	**TRANSIENTS**	**9**
Transient analysis using Laplace Transforms - Transient response for RL, RC and RLC circuits excited by DC and AC sources.		
UNIT V	**THREE PHASE CIRCUITS**	**6**
Star and delta systems - Voltage, Current and Power in star and delta connected system - Three phase balanced and unbalanced circuit - Three wire and Four wire systems - Power measurement in three phase circuits.		
		TOTAL: 45 PERIODS

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Explain fundamental concepts in AC and DC circuits
CO2:	Apply fundamental laws and network theorems in electric circuits.
CO3:	Interpret the concepts of Resonance and Coupled Circuits.
CO4:	Determine the DC and AC circuit transients.
CO5:	Explain balanced and unbalanced loads in three phase AC circuits.
TEXT BOOKS:	
1	Sudhakar A. and Shyammohan S. Palli, "Circuits and networks- Analysis and Synthesis", 5th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2017. (Unit I,II,III and V)
2	A.Nagoor Kani, "Circuit Theory", 2nd Edition, McGraw Hill Education, New Delhi, 2015. (Unit IV)
REFERENCES:	
1	Charles K. Alexander , Matthew N.O. Sadiku , "Fundamentals of Electric Circuits", 7thEdition, Tata McGraw Hill Publishing Company, New Delhi, 2022
2	Abhijit Chakrabarti, "Circuit Theory Analysis and Synthesis", 7th Revised Edition, DhanapatRai& Co., New Delhi, 2018.
3	Robert L. Boylestad, "Introductory Circuit Analysis", 13thEdition, Pearson Education, India, 2018
4	W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw Hill Education, 2013.
5	A. A. Nimje and D. P. Kothari, "Electrical Circuit Analysis and synthesis", New Age International Publications, 2017

Course outcomes EE22202	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	-	-	-	-	-	-	1	-	1	-
CO2	2	1	1	1	-	-	-	-	-	-	-	1	-	1	-
CO3	2	-	1	2	-	-	-	-	-	-	-	-	-	1	-
CO4	2	1	2	1	1	-	-	-	-	-	-	2	-	1	-
CO5	2	1	-	1	1	-	-	-	-	-	-	-	-	1	-
CO	2	1	2	1	-	-	-	-	-	-	-	2	-	2	-

Table of Specifications for End Semester Question Paper

EE22202 - ELECTRIC CIRCUIT ANALYSIS

Unit No. and Title	Total 2 Marks Qns.	Total 16 Marks Qns.	Cognitive Level			
			Remember (Re)	Understand (Un)	Apply (Ap)	Analyse(An) Evaluate(Ev)
			No. of Qns. (marks) and CO			
UNIT I – DC and AC Circuits	2	1 either or	2(2) – CO1	-	1 either or (16) – CO1	-
UNIT II - Network Theorems	2	1 either or	2(2) - CO2	-	1 either or (16) - CO2	-
UNIT III – Resonance and Coupled Circuits	2	1 either or	2(2)-CO3	-	1 either or (16) - CO3	-
UNIT IV – Transients	2	1 either or	2(2) - CO4	-	1 either or (16) - CO4	-
UNIT V – Three Phase Circuits	2	1 either or	2(2) -CO5	1 either or (16) — CO5	-	-
Total Qns.	10	5 either or	10(2)	1 either or (16)	4 either or (64)	-
Total Marks	20	80	20	16	64	-
Weightage	20 %	80%	20%	16%	64%	-

Weightage for COs					
	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	20	20	20	20	20
Weightage	20%	20%	20%	20%	20%

ME22201	**ENGINEERING GRAPHICS**	**L**	**T**	**P**	**C**
		2	**0**	**2**	**3**

COURSE OBJECTIVES:

- To draw the engineering curves.
- To draw orthographic projection of points and lines
- To draw orthographic projection of solids and section of solids.
- To draw the development of surfaces
- To draw the isometric projections of simple solids and freehand sketch of simple objects.

CONCEPTS AND CONVENTIONS:

Importance of graphics in engineering applications - Use of drafting instruments - BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning.

UNIT I	**PLANE CURVES**	**12**
Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — construction of involutes of square and circle — Drawing of tangents and normal to the above curves.		
UNIT II	**PROJECTION OF POINTS, LINES AND PLANES**	**12**
Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to any one principal plane.		
UNIT III	**PROJECTION OF SOLIDS**	**12**
Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to any one of the principal planes by rotating object method.		
UNIT IV	**SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES**	**12**
Sectioning of solids (Prisms, pyramids cylinders and cones) in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones.		
UNIT V	**ISOMETRIC PROJECTIONS AND FREEHAND SKETCHING**	**12**
Principles of isometric projection — isometric scale - isometric projections of simple solids and truncated solids - Prisms, pyramids & cylinders, in simple vertical positions. Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects. Practicing three dimensional modeling of projection of simple objects by CAD Software (Demonstration purpose only).		
		TOTAL: 60 PERIODS
COURSE OUTCOMES:		
At the end of the course the students would be able to		
1	Recall the existing national standards and interpret a given three dimensional drawing	
2	Interpret graphics as the basic communication and methodology of the design process	
3	Acquire visualization skills through the concept of projection	
4	Develop the sectioned solids and discover its true shape	
5	Develop imagination of physical objects to be represented on paper for engineering communication.	
TEXTBOOKS:		
1	Natrajan K.V., “A Text Book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2018.	
2	Jeyapoovan T., “ENGINEERING GRAPHICS using AutoCAD”, Vikas Publishing House, 7th Edition, 2015.	
REFERENCES:		
1	Venugopal K. and Prabhu Raja V., “Engineering Graphics", New Age International (P) Limited, 2008.	
2	Julyes Jai Singh S., “Engineering Graphics”, SRM tri sea publishers, Nagercoil,7th Edition,2015.	

3	Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
4	Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition, 2017.
5	Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production,

Course outcomes ME22201	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	-	-	-	-	2	-	-	1	2	-
CO2	3	1	-	-	-	-	-	-	-	2	-	-	1	2	-
CO3	3	1	-	-	-	-	-	-	-	-	-	-	1	2	-
CO4	3	1	-	-	-	-	-	-	-	2	-	-	1	-	-
CO5	3	1	-	-	-	-	-	-	-	2	-	-	1	2	-
CO	3	1	-	-	-	-	-	-	-	2	-	-	1	2	-

Table of Specifications for End Semester Question Paper

ME22201 ENGINEERING GRAPHICS

Unit No. and Title	Total 20 Marks Qus.	Cognitive Level			
		Remember (Re)	Understand (Un)	Apply (Ap)	Analyse (An) Evaluate(Ev)
UNIT I -Plane Curves	1either or	-	1either or (20)-CO1	-	-
UNIT II - Projection of Points, Lines and Planes	1either or	-	1either or (20)-CO2	-	-
UNIT III - Projection of Solids	1either or	-	-	1either or (20)-CO3	-
UNIT IV - Section of Solids And Development Of Surfaces	1either or	-	-	1either or (20)-CO4	-
UNIT V -Isometric Projections and Freehand Sketching	1either or	-	-	1either or (20)-CO5	-
Total Qns. Title	5either or	-	2 either or (20)	3 either or (20)	-
Total Marks	100	-	40	60	-
Weightage	100%	-	40%	60%	-

Weightage for COs					
	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	20	20	20	20	20
Weightage	20%	20%	20%	20%	20%

GE3152	**HERITAGE OF TAMIL**	**L**	**T**	**P**	**C**
		1	**0**	**0**	**1**

COURSE OBJECTIVES:

- To help students understand the values of Tamil Language, basic language families in India and types of Tamil literature.
- To facilitate the students to understand Tamil heritage of rock arts, paintings and musical instruments in their economic life.
- To facilitate the students in understanding the harmony existing in Tamils martial arts.
- To create an awareness on concept of Thinai Tamils and its values.
- To understand the contribution and Influence of Tamils in Indian culture.

UNIT I	**LANGUAGE AND LITERATURE**	**3**

Environment – Ecosytem – Structure and function of an ecosystem – Energy flow in an ecosystem – Food chain and food web –. Biodiversity – Types – Values, threats and conservation of biodiversity – Endangered and endemic species – Hot spot of biodiversity – Biodiversity at state level, national level and global level.

UNIT II	**HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE**	**3**

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - -Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT III	**FOLK AND MARTIAL ARTS**	**3**

Therukoothu, Karagattam - Villu Pattu - Kaniyan Koothu – Oyillattam - Leather puppetry- Silambattam – Valari - Tiger dance - Sports and Games of Tamils.

UNIT IV	**THINAI CONCEPT OF TAMILS**	**3**

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

UNIT V	**CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE**	**3**

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL: 15 PERIODS

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Describe the importance of Tamil Language and types of Tamil literature.
CO2:	Illustrate their knowledge in rock art paintings to modern art.
CO3:	Demonstrate a strong foundational knowledge in martial arts.
CO4:	Explain the concept of Thinai Tamils and its values
CO5:	Describe the contribution of Tamils in Indian culture.

TEXT & REFERENCE BOOKS:	
1.	jkpof tuyhW – kf;fSk; gz;ghLk; – Nf. Nf. gps;is (ntspaPL : jkpo;ehL ghlE}y; kw;Wk; fy;tpay; gzpfs; fofk;.
2.	Dr.K.K.Pillay, Social Life of Tamils, A joint publication of TNTB & ESC and RMRL.
3.	Dr.S.Singaravelu, "Social Life of the Tamils - The Classical Period", International Institute of Tamil Studies.
4.	Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu, "Historical Heritage of the Tamils", International Institute of Tamil Studies.
5.	Dr.M.Valarmathi, " The Contributions of the Tamils to Indian Culture", International Institute of Tamil Studies.
6.	Dr.K.K.Pillay, "Studies in the History of India with Special Reference to Tamil Nadu".

GE3152	**jkpou; kuG**	**L**	**T**	**P**	**C**
		1	**0**	**0**	**1**

COURSE OBJECTIVES:
• jkpo; nkhopapd; kjpg;Gfs;> ,e;jpahtpy; cs;s mbg;gil nkhopf;FLk;gq;fs; kw;Wk; jkpo; ,yf;fpa tiffis khzth;fs; Ghpe;Jnfhs;s cjTjy;.
• khzth;fs; ghiw Xtpaq;fs;> rpw;gf;fiyfs; kw;Wk; ,irf;fUtpfspd; top jkpo; ghuk;ghpaj;ijg; Ghpe;Jnfhs;s trjp nra;jy;
• jkpoh;fspd; fiy kw;Wk; tPu tpisahl;Lfisg; Ghpe;J nfhs;tjw;F khzth;fSf;F cjTjy;.
• jkpoh;fspd; jpizf; fUj;Jf;fs; kw;Wk; mth;fspd; tho;f;if newpfisg; gw;wp khzth;fSf;F tpopg;Gzh;it Vw;gLj;Jjy;
• ,e;jpa fyhr;rhuj;jpy; jkpoh;fspd; gq;fspg;igAk; mjd; jhf;fj;ijAk; khzth;fs; Ghpe;Jnfhs;s nra;jy;.

myF I	**nkhop kw;Wk; ,yf;fpak;**	**3**
,e;jpa nkhopf; FLk;gq;fs; – jpuhtpl nkhopfs; – jkpo; xU nrk;nkhop – jkpo; nrt;tpyf;fpaq;fs; – rq;f ,yf;fpaj;jpd; rkar;rhu;gw;w jd;ik – rq;f ,yf;fpaj;jpy; gfpu;jy; mwk; – jpUf;Fwspy; Nkyhz;ikf; fUj;Jf;fs; – jkpo;f; fhg;gpaq;fs;> jkpofj;jpy; rkz ngsj;j rkaq;fspd; jhf;fk; – gf;jp ,yf;fpak;> Mo;thu;fs; kw;Wk; ehad;khu;fs; – rpw;wpyf;fpaq;fs; – jkpopy; etPd ,yf;fpaj;jpd; tsu;r;rp – jkpo; ,yf;fpa tsu;r;rpapy; ghujpahu; kw;Wk; ghujpjhrd; MfpNahupd; gq;fspg;G.		
myF II	**kuG – ghiw Xtpaq;fs; Kjy; etPd Xtpaq;fs; tiu – rpw;gf;fiy.**	**3**
eLfy; Kjy; etPd rpw;gq;fs; tiu – [k;nghd; rpiyfs; – goq;Fbapdu; kw;Wk; mtu;fs; jahupf;Fk; iftpidg; nghUl;fs;> nghk;ikfs; – Nju; nra;Ak; fiy – RLkz; rpw;gq;fs; – ehl;Lg;Gwj; nja;tq;fs; – FkupKidapy; jpUts;Stu; rpiy – ,irf; fUtpfs; – kpUjq;fk;> giw> tPiz> aho;> ehj];tuk; – jkpou;fspd; r%f nghUshjhu tho;tpy; Nfhtpy;fspd; gq;F		
myF III	**ehl;Lg;Gwf; fiyfs; kw;Wk; tPu tpisahl;Lfs;**	**3**

njUf;$j;J> fufhl;lk;> tpy;Yg;ghl;L> fzpahd; $j;J> xapyhl;lk;> Njhy;ghitf; $j;J> rpyk;ghl;lk;> tsup> Gypahl;lk;> jkpou;fspd; tpisahl;Lf;fs;.		
myF IV	**jkpou;fspd; jpizf; Nfhl;ghLfs;.**	**3**
Jkpofj;jpd; jhtuq;fSk;> tpyq;FfSk; – njhy;fhg;gpak; kw;Wk; rq;f ,yf;fpaj;jpy; mfk; kw;Wk; Gwf;Nfhl;ghLfs; – jkpou;fs; Nghw;wpa mwf;Nfhl;ghL – rq;ffhyj;jpy; jkpofj;jpy; vOj;jwpTk;> fy;tpAk; – rq;ffhy efuq;fSk; Jiw Kfq;fSk; – rq;f fhyj;jpy; Vw;Wkjp kw;Wk; ,wf;Fkjp – fly; fle;j ehLfspy; Nrhou;fspd; ntw;wp.		
myF V	**,e;jpa Njrpa ,af;fk; kw;Wk; ,e;jpa gz;ghl;bw;F jkpou;fspd; gq;fspg;G**	**3**
,e;jpa tpLjiyg;Nghupy; jkpou;fspd; gq;F – ,e;jpahtpd; gpwg;gFjpfspy; jkpo;g; gz;ghl;bd; jhf;fk; – Rakupahij ,af;fk; – ,e;jpa kUj;Jtj;jpy; rpj;j kUj;Jtj;jpd; gq;F – fy;ntl;Lfs;> ifnaOj;Jg;gbfs; – jkpo;g; Gj;jfq;fspd; mr;R tuyhW.		
TOTAL: 15 PERIODS		
COURSE OUTCOMES:		
,g;ghlj; jpl;lj;jpd; %yk; khzth;fs; ngWk; gad;fs;:		
CO1:	jkpo; nkhopapd; Kf;fpaj;Jtk; kw;Wk; ,yf;fpa tiffis tpthpf;f KbAk;.	
CO2:	ghiw Xtpaq;fs; Kjy; etPd fiyfs; tiu mth;fspd; mwpit tpthpf;f KbAk;.	
CO3:	jw;fhg;Gf; fiyspd; tYthd mbj;js mwpit tpthpf;f KbAk;.	
CO4:	jkpoh;fspd; jpizf; fUj;Jf;fs; kw;Wk; mjd; kjpg;Gfis tpsf;f KbAk;.	
CO5:	,e;jpa fyhr;rhuj;jpy; jkpoh;fspd; gq;fspg;ig tpthpf;f ,aYk;.	
TEXT & REFERENCE BOOKS:		
1.	jkpof tuyhW – kf;fSk; gz;ghLk; – Nf. Nf. gps;is (ntspaPL : jkpo;ehL ghlE}y; kw;Wk; fy;tpay; gzpfs; fofk;.	
2.	Dr.K.K.Pillay, Social Life of Tamils, A joint publication of TNTB & ESC and RMRL.	
3.	Dr.S.Singaravelu, "Social Life of the Tamils - The Classical Period", International Institute of Tamil Studies.	
4.	Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu, "Historical Heritage of the Tamils", International Institute of Tamil Studies.	
5.	Dr.M.Valarmathi, " The Contributions of the Tamils to Indian Culture", International Institute of Tamil Studies.	
6.	Dr.K.K.Pillay, "Studies in the History of India with Special Reference to Tamil Nadu".	

Course outcomes GE3152	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
CO	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-

EN22201	**TECHNICAL ENGLISH**	**L**	**T**	**P**	**C**

		2	**0**	**2**	**3**

COURSE OBJECTIVES:

- To widen strategies and skills to augment ability to read and comprehend engineering and technology texts.
- To develop writing skill to make technical presentations.
- To draft convincing job applications and effective reports.
- To strengthen listening skills to comprehend technical lectures and talks in their areas of specialization.
- To cultivate speaking skills both technical and general.

UNIT I	**LANGUAGE STUDY**	**12**

Technical Vocabulary- synonyms, antonyms, prefix and suffix, word formation, Homonyms and Homophones - puzzles,- Reading: skimming a reading passage – scanning for specific information- Instruction- Interpreting – Writing: Recommendation- Checklist.

UNIT II	**READING AND STUDY SKILLS**	**6**

Active and Passive voice- Extended Definitions- Imperatives- Numerical Adjectives- Purpose Statement – Reading: Critical reading- Newspaper articles- journal reports- editorials and opinion blogs - Report Writing: Fire Accident, Industrial visit, Project report, feasibility report, survey report, business report.

UNIT III	**WRITING SKILLS- INTRODUCTION TO PROFESSIONAL WRITING**	**6**

Error Spotting/Common Errors- Concord-Compound words- Abbreviations and Acronyms- Discourse Markers - Finding key information – shifting facts from opinion- interpreting visual material- making inference from the reading passage - Interpretation of charts- - Minutes of the meeting- Paraphrasing- Proposal writing.

UNIT IV	**TECHNICAL WRITING AND GRAMMAR**	**6**

If Conditional Clauses- Prepositional Phrases- Fixed and semi fixed expressions- -e-mail communication- reading the attachment files having a poem /joke / proverb/sending their responses through e-mail.- Job application letter and Resume/CV/ Bio-data.

UNIT V	**EXTENDED WRITING AND LANGUAGE STUDY**	**6**

Articles- Cause and Effect expressions- Collocations- Sequencing words- Reading longer technical texts and taking down notes- Structure of Essay- Types of Essay: Narrative essay- Descriptive Essay- Analytical Essay- Cause and Effect Essay – Compare and contrast essays.

TOTAL : 30 PERIODS

PRACTICAL EXERCISES

Listening Skills – Listening for professional Development

Listening to UPSC Toppers Mock Interviews- Listening to debates/discussions/different viewpoints /scientific lectures/event narrations/documentaries/telephonic conversations

Speaking Skills –emphasizing communicative establishment

Seeking Information -asking and giving directions- narrating personal experiences/ events- answering interview questions- picture description- presenting a product and giving instruction to use a product – mini presentations-role plays- speaking in formal and informal situations-speaking about one's locations - speaking about great personalities –describing a simple process- telephone skills and etiquette

TOTAL: 30 PERIODS

TOTAL (T+P) = 60 PERIODS

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
Infer advanced technical texts from varied technical genres to expand engineering knowledge and explore more ideas.	
Analyze technical contents written on par with international standards and rewrite contents using the right vocabulary without grammatical errors to make their articles published in reputed journals.	
Present reports and job letters utilizing the required format prescribed on par with international standards using the exact vocabulary to make their works worthy to be read .	
Employ the language tones and styles appropriately in interviews and Group Discussions effortlessly following the strategies expected by the corporate world	
Appraise the need for new products and write feasibility and survey reports following the format prescribed in a way to create awareness.	
TEXT BOOKS:	
Mike Markrl, " Technical Communication", Palgrave Macmillan, London, 2012.	
Sumant,S and Joyce Pereira, "Technical English II", Chennai: Vijay Nicole Imprints Private Limited, 2014.	
Kumar, Sanjay and Pushp Lata, "Communication Skills: A Workbook", New Delhi: OUP, 2018.	
REFERENCES:	
Raman, Meenakshi & Sangeetha Sharma, "Communication Skills", New Delhi: OUP, 2018.	
Rizvi M, Ashraf, " Effective Technical Communication", New Delhi: Tata McGraw-Hill Publishing Company Limited, 2007.	
Kumar, Sanjay and Pushp Lata, "Communication Skills: A Workbook", New Delhi: OUP, 2018.	
Means, L. Thomas and Elaine Langlois, "English & Communication for Colleges", Cengage Learning, USA: 2007.	
Greendaum, Sydney and Quirk, Randolph, "A Student's Grammar of the English Language", Pearson Education.	

Course outcomes EN22201	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	3	-	2	-	1	-
CO2	-	-	-	-	-	-	-	-	2	3	-	2	-	1	-
CO3	-	-	-	-	-	-	-	-	2	3	-	2	-	1	-
CO4	-	-	-	-	-	-	-	-	2	3	-	2	-	1	-
CO5	-	-	-	-	-	-	-	-	2	3	-	2	-	1	-
CO	-	-	-	-	-	-	-	-	2	3	-	2	-	1	-

Table of Specifications for End Semester Question Paper

EN22201 - TECHNICAL ENGLISH

Unit No. and Title	Total 2 Marks Qns.	Total 16 Marks Qns.	Cognitive Level			
			Remember (Re)	**Understand** (Un)	**Apply** (Ap)	**Analyse** (An) **Evaluate**(Ev)
			No. of Qns. (marks) and CO			
UNIT-I: Language Study	2	1 compulsory	1(2)-CO1	1(2)-CO1 1Compulsory (16)- CO1	-	
UNIT-II: Reading And Study Skills	2	1 either or	2(2)-CO2	1 either or (16)- CO2	-	
UNIT-III: Writing Skills	2	1 either or	1(2)- CO3	1(2)- CO3	1either or (16)- CO3	
UNIT-IV: Technical Writing And Grammar	2	1 either or	1(2)-CO4	1(2)- CO4	1either or (16)- CO4	
UNIT-V: Extended Writing And Language Study	2	1 either or	1(2)-CO5	1(2)-CO5	1 either or (16)- CO5	
Total Qns.	10	1 Compulsory & 4 either or	6(2)	4(2) 1 Compulsory &1 either or (16)	3 either or (16)	
Total Marks	20	80	12	40	48	
Weightage	20%	80%	12%	40%	48%	
Weightage for COs						

	CO1	**CO2**	**CO3**	**CO4**	**CO5**	
Total Marks	20	20	20	20	20	
Weightage	20%	20%	20%	20%	20%	

PH22202	**PHYSICS FOR ELECTRONICS ENGINEERING (Common to ECE &EEE)**	**L**	**T**	**P**	**C**
		2	**0**	**2**	**3**

COURSE OBJECTIVES:

- To understand the concepts of light, electron transport properties and the essential principles of semiconductors
- To become proficient in magnetic properties of materials and the functioning of optical devices
- To know the basics of quantum structures and Single electron transistor
- To induce the students to design new devices that serve humanity by applying the knowledge gained during the course

UNIT I	PHOTONICS	6
Interference – Air wedge – LASER – population inversion - Einstein coefficient's – NdYAG Laser - CO2 laser – semiconductor laser – Optical fibre – Total internal reflection – propagation of light – Numerical Aperture and Acceptance angle – Fiber optic communication system – Endoscopy.		
UNIT II	**ELECTRICAL PROPERTIES OF MATERIALS**	**6**
Classical free electron theory - Expression for electrical conductivity and Thermal conductivity, Wiedemann-Franz law – Success and failures - Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Band theory of solids - Electron effective mass – concept of hole.		
UNIT III	**SEMICONDUCTING MATERIALS**	**6**
Semiconductors –direct and indirect band gap semiconductors – Intrinsic semiconductors Carrier concentration, band gap in intrinsic semiconductors – extrinsic semiconductors - N-type & P-type semiconductors – Variation of carrier concentration and Fermi level with temperature - Hall effect - measurement of Hall coefficient – applications		
UNIT IV	**MAGNETIC AND DIELECTRIC PROPERTIES OF MATERIALS**	**6**
Magnetic dipole moment – permeability, susceptibility - Magnetic material classification: diamagnetism, paramagnetism, ferromagnetism, antiferromagnetism, ferrimagnetism – B-H curve – Hard and soft magnetic materials - Magnetic recording - Dielectrics - Types of polarization - Internal field and Clausius- Mossoti equation		
UNIT V	**OPTOELECTRONIC AND NANODEVICES**	**6**
Carrier generation and recombination processes - Photo diode – solar cell - Organic LED – Optical data storage - Quantum confinement – Quantum structures - single electron phenomena and single electron transistor - Quantum dot laser		
		TOTAL: 30 PERIODS

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Recall the basic concepts of light, electron transport properties of conductors and basic principles of semiconductors
CO2:	Define the magnetic properties of materials and the principles of optoelectronic and nano devices
CO3:	Illustrate laser and fibre optics, classical and quantum concepts of conducting materials physics of semiconducting materials
CO4:	Summarize the functioning of various magnetic, optoelectronic and nano devices
CO5:	Demonstrate the concepts of optics, fibre optics, moduli of elasticity and thermal energy behavior of conductors, semiconductors, magnetic and dielectric materials and also the functioning of optical and nano devices in various engineering applications

TEXT BOOKS:	
1.	Gaur, R.K & Gupta.S.L, Engineering Physics, Dhanpat Rai Publishers, 2016.
2.	Kasap,S.O. Principles of Electronic Materials and Devices, McGraw-Hill Education 2017.

REFERENCES:	
1.	Jasprit Singh, Semiconductor Devices: Basic Principles, Wiley 2012.
2.	Kittel, C. Introduction to Solid State Physics. Wiley, 2017.
3.	Garcia,N. & Damask, A. Physics for Computer Science Students, Springer-Verlag, 2012
4	Hanson, G.W. ―Fundamentals of Nanoelectronics, Pearson Education, 2009.
5	Rogers, B., Adams, J. & Pennathur, S. Nanotechnology: Understanding Small Systems CRC Press, 2014.

LIST OF EXPERIMENTS	
1	Uniform bending – Determination of Young's modulus
2	Air-wedge – Thickness of thin wire
3	Spectrometer – Grating
4	LASER – Wavelength and particle size determination
5	Optical fibre – Acceptance angle and Numerical aperture
6	Band gap determination
	TOTAL: 30 PERIODS
	TOTAL (T+P) = 60 PERIODS

Course outcomes PH22202	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	-	-	-	-	-	-	1	-	1	-
CO2	2	1	-	-	-	-	-	-	-	-	-	1	-	1	-
CO3	2	1	-	-	-	-	-	-	-	-	-	1	-	1	-
CO4	2	1	-	-	-	-	-	-	-	-	-	1	-	1	-
CO5	3	3	-	-	-	-	-	-	2	1	-	1	-	1	-
CO	2	1	-	-	-	-	-	-	2	1	-	1	-	1	-

Table of Specifications for End Semester Question Paper

PH 22202 - PHYSICS FOR ELECTRONICS ENGINEERS

Unit No. and Title	Total 2 Marks Qns.	Total 16 Marks Qns.	Cognitive Level			
			Remember (Re)	**Understand** (Un)	**Apply** (Ap)	**Analyse (An) Evaluate (Ev)**
			No. of Qns. (marks) and CO			
UNIT I - Photonics	2	1 either or	1(2)-CO1	1(2)-CO3	1 either or (16)- CO5	-
UNIT II - Electrical Properties of Materials	2	1 either or	1(2)-CO1	1(2)- CO3 1 either or (16)- CO3	-	-
UNIT III - Semiconducting Materials	2	1 either or	2(2)- CO1	-	1 either or (16)- CO5	-

UNIT IV - Magnetic and Dielectric Properties of Materials	2	1 either or	1(2)-CO2	1 (2)- CO4 1either or (16)- CO4	-	- .
UNIT V - Optoelectronic and Nanodevices	2	1 either or	2(2)-CO2	-	1 either or (16)- CO5	-
Total Qns.	10	5 either or	7(2)	3(2) 2 either or (16)	3 either or (16)	-
Total Marks	20	80	14	38	48	-
Weightage	20%	80%	14%	38%	48%	-

Weightage for COs

	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	8	6	20	18	48
Weightage	8%	6%	20%	18%	48%

CH22201	**ENVIRONMENT AND SUSTAINABILITY**	**L**	**T**	**P**	**C**
		2	**0**	**2**	**3**

COURSE OBJECTIVES:

- To understand the concept of ecosystem and biodiversity.
- To conversant with various types of pollution and its effects.
- To obtain knowledge on natural resources and its exploitation.
- To understand the social issues related to environment and methods to protect.
- To gain knowledge on sustainability and environment.

UNIT I **ECOSYSTEM AND BIODIVERSITY** **6**

Environment – Ecosytem – Structure and function of an ecosystem – Energy flow in an ecosystem – Food chain and food web –.Biodiversity – Types – Values, threats and conservation of biodiversity – Endangered and endemic species – Hot spot of biodiversity – Biodiversity at state level, national level and global level.

UNIT II **NATURAL RESOURCES** **6**

Introduction – Forest resources – Uses and Overexploitation - Deforestation – causes and consequences – Water resources – effect of over utilisation of water – Food resources – Impacts of modern agriculture (pesticides, fertilizers, water logging, salinity) – Sustainable Energy resources – Wind, Solar, hydroelectric power, geothermal – Land resources – Desertification, soil erosion – Role of an individual in the conservation of natural resources.
Case study – Deforestation, water conflicts, fertilizer and pesticide problem.

UNIT III **ENVIRONMENTAL POLLUTION AND MANAGEMENT** **7**

Definition, causes, effects and control measures of air pollution, water pollution, noise pollution, thermal pollution and marine pollution – Waste water treatment - Waste management – solid waste, bio waste, e-waste - Disaster management – Flood, cyclone, earthquake

UNIT IV	SOCIAL ISSUES AND HUMAN HEALTH	6
Population explosion and its effects on environment — variation of population among nations - Environmental issues and Human health – Food adulteration – Risk of food adulteration – Detection and prevention of food adulteration - COVID-19 – Human rights – Value education		
UNIT V	**SUSTAINABLE DEVELOPMENT AND ENVIRONMENT**	**5**
Sustainable development – needs and challenges — Goals – Aspects of sustainable development – Assessment of sustainability - Environmental ethics – Green chemistry – Eco mark, Eco products – EIA – Regional and local environmental issues and possible solutions - Role of engineering in environment and human health		
		TOTAL: 30PERIODS

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Recall the basic concepts of environment and sustainable development.
CO2:	Summarize the types of pollution, various natural resources and food adulterants.
CO3:	Explain the methods for waste management and detection of adulterants.
CO4:	Apply the gained knowledge to overcome various issues related to health and environment.
CO5:	Identify suitable methods for local environmental issues and sustainability.

TEXT BOOKS:	
1.	Benny Joseph, "Environmental Science and Engineering", Tata McGraw Hill, New Delhi, 2017.
2.	Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 2ndEdition, Pearson Education, 2015.

REFERENCES:	
1.	Erach Bharucha, "Text book of Environmental studies" Universities Press (I) PVT LTD, Hyderabad, 2015.
2.	Rajagopalan. R, "Environmental Studies - From Crisis to Cure", Oxford University Press, 2015.
3.	G. Tyler Miller and Scott E. Spoolman, —"Environmental Science", Cengage Learning India PVT LTD, 2014.
4	Ruth F. Weiner and Robin A. Matthews. Butterworth, "Environmental Engineering", Heineman Publications, 4th Edition.
5	Dash M.C, "Concepts of Environmental Management for Sustainable Development", Wiley Publications, 2019.

EXPERIMENTS	
1.	Determination of DO content of waste water sample (Winkler's method).
2.	Determination of chloride content of water sample by Argentometric method
3.	Estimation of copper content in water by Iodometry.
4.	Determination of Ca / Mg in waste water sample
5.	Detection of adulterant in ghee/edible oil/coconut oil.
6.	Detection of adulterant in sugar/honey/chilli powder.
	TOTAL:30 PERIODS
	TOTAL (T+P) = 60 PERIODS

Course outcomes CH22201	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	3	-	1	1	-	1	1	-	-
CO2	3	-	-	-	-	-	3	-	1	1	-	1	1	-	-
CO3	3	-	-	-	-	-	3	-	1	1	-	1	1	-	-
CO4	3	-	-	-	-	-	3	-	1	1	-	1	1	-	-
CO5	3	-	-	-	-	-	3	-	1	1	-	1	1	-	-
CO	3	-	-	-	-	-	3	-	1	1	-	1	1	-	-

Table of Specifications for End Semester Question Paper

CH22201 - ENVIRONMENT AND SUSTAINABILITY

Unit No. and Title	Total 2 Marks Qns.	Total 16 Marks Qns.	Cognitive Level			
			Remember (Re)	**Understand** (Un)	**Apply** (Ap)	**Analyse (An) Evaluate (Ev)**
			No. of Qns. (marks) and CO			
UNIT I – Ecosystem and Biodiversity	2	1 either or	1(2)-CO1	1(2)-CO2	1 either or (16)- CO4	-
UNIT II – Natural Resources	2	1 either or	1(2)-CO1	1(2)- CO2	1 either or (16)- CO4	-
UNIT III – Environmental Pollution and Management	2	1 either or	-	1(2)- CO2 1(2)- CO3 1 either or (16)- CO3	-	-
UNIT IV – Social Issues And Human Health	2	1 either or	-	1(2)- CO2 1(2)- CO3	1 either or (16)- CO4	- .
UNIT V – Sustainable Development and Environment	2	1 either or	2(2)-CO1	-	1 either or (16)- CO5	-
Total Qns.	10	5 either or	4 (2)	6(2) 1 either or (16)	4 either or (16)	-
Total Marks	20	80	8	28	64	-
Weightage	20%	80%	8%	28%	64%	-

Weightage for COs					
	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	8	8	20	48	16
Weightage	8%	8%	20%	48%	16%

EE22203	ELECTRIC CIRCUIT ANALYSIS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To simulate various electric circuits using Pspice / Matlab / e-Sim / Scilab
- To gain practical experience on electric circuits and verification of theorems

LIST OF EXPERIMENTS:

1. Simulation and experimental verification of series and parallel electrical circuit using fundamental laws.
2. Simulation and experimental verification of electrical circuit problems using Thevenins theorem.
3. Simulation and experimental verification of electrical circuit problems using Nortons theorem.
4. Simulation and experimental verification of electrical circuit problems using Superposition theorem.
5. Simulation and experimental verification of Maximum Power transfer theorem.
6. Simulation and Experimental validation of R-C,R-L and RLC electric circuit transients
7. Simulation and Experimental validation of frequency response of RLC electric circuit.
8. Design and implementation of series and parallel resonance circuit.
9. Simulation and experimental verification of three phase balanced and unbalanced star, delta networks circuit (Power and Power factor calculations).

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Verify the fundamental electrical laws for the given DC/AC circuit (Ex 1)
CO2:	Verify the various electrical theorems (Superposition, Thevenin , Norton and maximum power transfer) for the given DC/AC circuit (Ex 2-5)
CO3:	Analyze transient behavior of the given RL/RC/RLC circuit. (Ex 6)
CO4:	Analyze frequency response of the given series and parallel RLC circuit.(Ex 7-8)
CO5:	Analyze the performance of the given three-phase circuit. (Ex 9)

Course outcomes EE22203	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	1	1	-	-	-	-	2	-	-	1	-	1	-
CO2	2	1	1	2	-	-	-	-	1	-	-	1	-	-	-
CO3	-	-	1	1	-	-	-	-	2	-	-	-	-	2	-
CO4	-	1	2	1	-	-	-	-	2	-	-	2	-	1	-
CO5	-	1	-	1	-	-	-	-	-	-	-	-	-	2	-
CO	2	1	1	1	-	-	-	-	2	-	-	1	-	2	-

ES22203	ENGINEERING PRACTICES LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for

1	Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planning; making joints in wood materials used in common household wood work.
2	Wiring various electrical joints in common household electrical wire work.
3	Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipment; Making a tray out of metal sheet using
4	Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP – A (CIVIL & MECHANICAL)

PART I	**CIVIL ENGINEERING PRACTICES**	**15**
PLUMBING WORK	Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household. Preparing plumbing line sketches. Laying pipe connection to the suction side of a pump Laying pipe connection to the delivery side of a pump. Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.	
WOOD WORK	Sawing, Planning and Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.	
PART II	**MECHANICAL ENGINEERING PRACTICES**	**15**
WELDING WORK	Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding. Practicing gas welding.	
BASIC MACHINING WORK	Perform turning operation in the given work piece. Perform drilling operation in the given work piece. Performing tapping operation in the given work piece.	
ASSEMBLY WORK	Assembling a centrifugal pump. Assembling a household mixer.	
SHEET METAL WORK	Making of a square tray	

GROUP – B (ELECTRICAL AND ELECTRONICS)

PART-I	**ELECTRICAL ENGINEERING PRACTICES**	**15**

Introduction to tools, switches, fuses, indicators and lamps.
One lamp controlled by one switch.
Series and parallel wiring.
Staircase wiring.
Fluorescent Lamp wiring.
Residential wiring.
Dismantle and assemble Iron Box.

PART-II	ELECTRONIC ENGINEERING PRACTICES	15
Introduction to electronic components and equipments Calculation of resistance using colour coding Verify the logic gates Measurement of AC signal parameters using CRO Soldering simple electronic circuits on a small PCB and checking continuity.		
		TOTAL: 60 PERIODS

COURSE OUTCOMES: **At the end of the course the students would be able to**	
1	Prepare various pipe and furniture fittings used in common household.
2	Perform the given metal joining and metal removal operation in the given work piece as per the dimensions.
3	Carry out basic home electrical works and appliances.
4	Elaborate on the components, gates, measurement of AC signal parameters and soldering practices.

Course outcomes ES22203	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	1	-	-	3	-	-	1	-	1	-
CO2	3	-	-	-	-	1	-	-	3	-	-	1	-	1	-
CO3	3	-	-	-	-	1	-	-	3	-	-	1	-	1	-
CO4	3	-	-	-	-	1	-	-	3	-	-	1	-	1	-
CO5	3	-	-	-	-	1	-	-	3	-	-	1	-	1	-
CO	3	-	-	-	-	1	-	-	3	-	-	1	-	1	-

SEMESTER III

MA22301	TRANSFORMS AND COMPLEX FUNCTIONS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:
• To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
• To acquaint the student with Fourier transform techniques used in wide variety of situations.
• To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.
• To develop an understanding of the standard techniques of complex variable theory in particular analytic function and its mapping property.
• To familiarize the students with complex integration techniques and contour integration techniques which can be used in real integrals.

UNIT I	FOURIER SERIES	12
Conditions for a Fourier expansion: Dirichlet's conditions –Fourier series - Euler's Formulae–General Fourier series for functions of polynomials in the interval $(0,2\pi)$ and $(0,2l)$ - Functions having points of continuity and discontinuity - Half range series: Half range sine and cosine series (polynomials only) Root mean square value		
UNIT II	**FOURIER TRANSFORMS**	**12**
Statement of Fourier integral theorem – Fourier transform – Properties of Fourier transform: Linear, Change of scale, Shifting and Modulation – Problems based on transforms of polynomial and constant functions – Inverse Fourier transform – Fourier transform pair – Problems using Convolution theorem – Parseval's identity(proof excluded).		
UNIT III	**Z – TRANSFORMS**	**12**
One sided Z-transform of sequence f(n) – Elementary properties: Linear, First shifting, Change of scale(statement only) – Problems based on properties – Z-transform of functions f(n) = n, n^2 using differentiation in Z-domain property – Convolution theorem, Initial and final value theorems(proof excluded) - Inverse Z-transform using partial fraction and convolution theorem.		
UNIT IV	**ANALYTIC FUNCTIONS**	**12**
Analytic functions – Necessary and sufficient conditions for analyticity (Proof excluded)- Test the analyticity of some standard complex functions – Cauchy-Riemann equations in Cartesian coordinates (Proof excluded) - Harmonic function – Conformal mapping: Translation, rotation and inversion – Fixed points - Critical points - Bilinear transformation.		
UNIT V	**COMPLEX INTEGRATION**	**12**
Line integral - Cauchy's integral theorem (excluding proof) – Cauchy's integral formula (excluding proof) – Poles – Residues – Cauchy's Residue theorem (excluding proof) – Application of Cauchy's residue theorem for evaluation of real definite integrals of the form $\int_0^{2\pi} f(cos\theta, sin\theta)\, d\theta$.		
		TOTAL: 60 PERIODS

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Find Fourier series for periodic functions.
CO2:	Apply Fourier and inverse Fourier transforms in engineering field.
CO3:	Apply Z-transform techniques in electrical engineering field.
CO4:	Determine analytic functions and various mappings of complex functions.
CO5:	Apply the fundamental concepts in complex integration.

TEXT BOOKS:	
1	Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2015. (Units I , II and III)
2	Bali N. P and Manish Goyal, "A Text book of Engineering Mathematics", Third Edition, Laxmi Publications Pvt Ltd.,2009. (Units IV and V)

REFERENCES:	
1	James. G., "Advanced Modern Engineering Mathematics", 4th Edition, Pearson Education, New Delhi, 2016.
2	Veerarajan. T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
3	Srimanta Pal, Suboth C. Bhunia, " Engineering Mathematics", Oxford University Press, New Delhi, 2015,
4	R.K.Jain, S.R.K.Iyengar, "Advanced Engineering Mathematics" 5th Edition, Narosa Publishing House Pvt.Ltd., New Delhi, 2016.
5	Narayanan. S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998.

Course outcomes MA22301	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	-	-	-	-	1	1	1
CO2	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-	1	-	1
CO4	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	-	1
CO	3	2	1	-	-	-	-	-	-	-	-	-	1	-	1

Table of Specifications for End Semester Question Paper

MA22301- TRANSFORMS AND COMPLEX FUNCTIONS

Unit No. and Title	Total 2 Marks Qus.	Total 16 Marks Qus.	Cognitive Level			
			Remember (Re)	Understand (Un)	Apply (Ap)	Analyse(An) Evaluate(Ev)
Unit-I: Fourier series	2	1either or	1(2)-CO1	1(2)-CO1	1either or (16)-CO1	-
Unit-II: Fourier Transforms	2	1either or	1(2)-CO2	1(2)-CO2	1either or (16)-CO2	-
Unit-III: Z-transforms	2	1either or	1(2)-CO3	1(2)-CO3	1either or (16)-CO3	-
Unit-IV: Analytic functions	2	1either or	-	2(2)-CO4	1either or (16)-CO4	-
Unit-V: Complex Integration	2	1either or	-	2(2)-CO5	1either or (16)-CO5	-
Total Qns. Title	10	5either or	3(2)	7(2)	5 either or (16)	-
Total Marks	20	80	6	14	80	-
Weightage	20%	80%	6%	14%	80%	-

Weightage for Cos

	CO1	CO2	CO3	CO4	CO5
Total Marks	20	20	20	20	20
Weightage	20%	20%	20%	20%	20%

EE22301	ELECTROMAGNETIC FIELDS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To introduce the basic mathematical concepts related to electromagnetic vector fields
- To impart knowledge on the concepts of Electrostatic fields and their applications
- To impart knowledge on magneto static fields and its applications.
- To impart knowledge on different methods of emf generation and Maxwell's equations
- To impart knowledge on Electromagnetic waves and characterizing parameters

UNIT I	ELECTROSTATICS – I	9

Sources and effects of electromagnetic fields – Coordinate Systems – Vector fields –Gradient, Divergence, Curl – theorems and applications - Coulomb's Law – Electric field intensity – Field due to discrete and continuous charges – Gauss's law and applications.

UNIT II	ELECTROSTATICS – II	9

Electric potential – Electric field and equipotential plots, Uniform and Non-Uniform field, Utilization factor – Electric field in free space, conductors, dielectrics - Dielectric polarization –Dielectric strength – Boundary conditions, Poisson's and Laplace's equations, Capacitance, Energy density, Applications.

UNIT III	MAGNETOSTATICS	9

Lorentz force, magnetic field intensity (H) – Biot–Savart's Law - Ampere's Circuit Law – H due to straight conductors, circular loop, infinite sheet of current, Magnetic flux density (B) – B in free space, conductor, magnetic materials – Magnetization, Boundary conditions, Magnetic force, Torque, Inductance, Energy density, Applications.

UNIT IV	ELECTRODYNAMIC FIELDS	9

Magnetic Circuits - Faraday's law – Transformer and motional EMF – Displacement current - Maxwell's equations (differential and integral form) – Relation between field theory and circuit theory – Applications.

UNIT V	ELECTROMAGNETIC WAVES	9

Electromagnetic wave generation and equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors- skin depth - Poynting vector.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Explain the different coordinate systems, laws, theorems and characterizing parameters.
CO2:	Determine the parameters of electrostatic fields.
CO3:	Explain the concepts in magneto static fields and its applications.
CO4:	Derive Maxwell's equations for electromagnetic fields.
CO5:	Derive Electromagnetic wave equation for different media and Poynting theorem.

TEXT BOOKS:

1	Mathew N. O. Sadiku, 'Principles of Electromagnetics', 6th Edition, Oxford University Press Inc. Asian edition, 2015.
2	William H. Hayt and John A. Buck, 'Engineering Electromagnetics', McGraw Hill Special Indian edition, 2014.

REFERENCES:	
1	V.V.Sarwate, 'Electromagnetic fields and waves', Second Edition, Newage Publishers, 2018.
2	J.P.Tewari, 'Engineering Electromagnetics - Theory, Problems and Applications', Second Edition, Khanna Publishers 2013.
3	Joseph. A.Edminister, 'Schaum's Outline of Electromagnetics, Fifth Edition (Schaum's Outline Series), McGraw Hill, 2018.
4	S.P.Ghosh, Lipika Datta, 'Electromagnetic Field Theory', First Edition, McGraw Hill Education(India) Private Limited, 2017.
5	K A Gangadhar, 'Electromagnetic Field Theory', Khanna Publishers; Sixteenth Edition Eighth Reprint :2015

Course outcomes EE22301	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	2	2	-	-	-	-	-	-	-	-	-	1	1	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	1	1	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	1	1	-	-
CO5	2	2	-	-	-	-	-	-	-	-	-	1	1	-	-
CO	2	2	-	-	-	-	-	-	-	-	-	1	1	-	-

Table of Specifications for End Semester Question Paper

EE22301 ELECTROMAGNETIC FIELDS

Unit No. and Title	Total 2 Marks	Total 16 Marks	Cognitive Level			
			Remember (Re)	**Understand (Un)**	**Apply (Ap)**	**Analyse(An) Evaluate(Ev)**
			No. of Qns. (marks) and CO			
Unit-I: Electrostatics – I	2	1 either or	2(2) – CO1	1 either or (16) — CO1		-
Unit-II: Electrostatics – II	2	1 either or	2 (2) - CO2	-	1 either or (16) — CO2	-
Unit-III: Magnetostatics	2	1 either or	2 (2) – CO3	1 either or (16) — CO3	-	-
Unit-IV: Electrodynamic Fields	2	I either or	2 (2) – CO4	1 either or (16) — CO3	-	-
Unit-V: Electromagnetic Waves	2	I either or	2 (2) – CO5	1 either or (16) — CO5	-	-

Total Qns.	10	5 either or	10(2)	4 either or (16)	1either or (16)	-
Total Marks	20	80	20	64	16	-
Weightage	20 %	80%	20%	64%	16%	-

Weightage for COs

	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	20	20	20	20	20
Weightage	20%	20%	20%	20%	20%

EE22302	**MEASUREMENTS AND INSTRUMENTATION**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES:

- To impart knowledge on the functional aspects of measuring instruments
- To explain the construction and working of various instruments.
- To illustrate the different methods to measure the unknown circuit elements.
- To explain the different storage and display devices.
- To illustrate the different methods to measure the unknown circuit elements.

UNIT I	**CONCEPTS OF MEASUREMENTS**	**9**

Elements of a generalized measurement system - Static and dynamic characteristics - Standards and calibration- Errors in measurement -Statistical evaluation of measurement data.

UNIT II	**MEASUREMENT OF PARAMETERS IN ELECTRICAL SYSTEMS**	**9**

Classification of instruments – moving coil and moving iron meters – Digital voltmeters, ammeters-Electrodynamometer type wattmeter—Induction type Energy meter-Smart meter – Insulation tester-static meter, earth resistance tester – Instrument transformers (CT & PT).

UNIT III	**DC AND AC BRIDGES**	**9**

Wheatstone bridge, Kelvin & Kelvin double bridge - Maxwell, Hay, Wien and Schering bridges - Transformer ratio bridges, Self-balancing bridges.

UNIT IV	**STORAGE AND DISPLAY DEVICES**	**9**

Magnetic disk and tape – Recorders, digital plotters and printers, CRT display, digital CRO, LED, LCD & Dot matrix display – Data Loggers**.**

UNIT V	**TRANSDUCERS AND DATA ACQUISITION SYSTEMS**	**9**

Classification of transducers – Selection of transducers – Resistive, capacitive & inductive Transducers – Piezoelectric, Hall effect, optical and digital transducers – Elements of data acquisition system – Smart sensors-Thermal Imagers.

TOTAL :45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Explain the functional aspects of measuring instruments.
CO2:	Explain the construction and working of various instruments.
CO3:	Apply the appropriate method to measure the unknown circuit elements.
CO4:	Explain the principle of various storage and display devices.
CO5:	Explain the different types of transducers and data Acquisition systems

TEXT BOOKS:	
1	H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010
2	A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, New Delhi, Edition 2011.
REFERENCES:	
1	M.M.S. Anand, 'Electronics Instruments and Instrumentation Technology', Prentice Hall India, New Delhi, 2009
2	J.J. Carr, 'Elements of Electronic Instrumentation and Measurement', Pearson Education India, New Delhi, 2011.
3	R.B. Northrop, 'Introduction to Instrumentation and Measurements', Taylor & Francis, New Delhi, 3rd Edition 2014.
4	R. K. Rajput, "Electrical and Electronics Measurements and Instrumentation", Chand Pub, 2016
5	E. O. Doebelin and D. N. Manik, "Measurement Systems – Application and Design", Tata McGraw-Hill, New Delhi, 6th Edition 2017.

Course outcomes EE22302	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	1	-	-	-	-		1	-	-	-
CO2	2	2	-	-	-	1	-	-	-	-		1	-	1	-
CO3	2	2	1	1	-	-	-	-	-	-		1	-	-	-
CO4	2	-	1	-	-	-	-	-	-	-		1	-	1	-
CO5	2	-	1	-	-	-	-	-	-	-		1	-	1	-
CO	2	2	1	1	-	1	-	-	-	-		1	-	1	-

Table of Specifications for End Semester Question Paper

EE22302 MEASUREMENTS AND INSTRUMENTATION

Unit No. and Title	Total 2 Marks	Total 16 Marks	Cognitive Level			
			Remember (Re)	Understand (Un)	Apply (Ap)	Analyse(An) Evaluate(Ev)
			No. of Qns. (marks) and CO			
Unit-I: Concepts of Measurements	2	1 either or	2(2) – CO1	1 either or (16) – CO1	-	-
Unit-II: Measurement of Parameters	2	1 either or	2(2) - CO2	1 either or	-	-

in Electrical Systems				(16) — CO2		
Unit-III: DC and AC Bridges	2	1 either or	2 (2) — CO3	1 either or (16) — CO3	1 either or (16) — CO3-	-
Unit-IV: Storage and Display Devices	2	I either or	2(2) - CO4	1 either or (16) — CO4	-	-
Unit-V: Transducers and Data Acquisition Systems	2	I either or	2(2) – CO5	1 either or (16) — CO4	-	-
Total Qns. Measurements and Instrumentation	10	5 either or	10(2)	4 either or (16)	-	-
Total Marks	20	80	20	64	16	-
Weightage	20 %	80%	20%	64%	16%	-

Weightage for COs

	CO1	**CO2**	**CO3**	**CO4**	**CO 5**
Total Marks	20	20	20	20	20
Weightage	20%	20%	20%	20%	20 %

EE22303	**DC MACHINES & TRANSFORMERS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES:

- To familiarize with the constructional details and Principle of operation of DC machines and transformers.
- To identify the appropriate machine for a given application based on its characteristics.
- To identify the appropriate test to determine the performance parameters of a given machine.
- To familiarize with the procedure for parallel operation of generators and transformers.
- To deliberate the working of auto transformer and three phase transformers.

UNIT I **DC GENERATORS** **9**

Principle of operation, constructional details, EMF equation, armature reaction and its effects, commutation, methods of improving commutation, equalizing connections, parallel operation of DC Generators, OCC and load characteristics of different types of DC Generators, Applications of DC Generators.

UNIT II	DC MOTORS	9
Principle of operation, significance of back emf, voltage equations , torque, power developed by armature, load characteristics of DC motors, losses and efficiency in DC machine, speed control of DC motors, starting methods of DC motors, Applications of DC motors.		
UNIT III	**SINGLE PHASE TRANSFORMER**	**9**
Construction and principle of operation, EMF equation, Transformer with and without winding resistance and leakage reactance, phasor diagrams, equivalent circuit, voltage regulation, losses and efficiency, all day efficiency, Applications of single-phase transformer.		
UNIT IV	**TESTING OF DC MACHINES AND TRANSFORMER**	**9**
Testing of DC machines: Brake test, Swinburne's test, Testing of transformer: open circuit and short circuit tests, back-to-back test, Introduction to tan delta testing and type testing.		
UNIT V	**AUTOTRANSFORMER AND THREE PHASE TRANSFORMER**	**9**
Construction, working and applications of auto transformer, comparison with two winding transformers. Three Phase Transformer- Construction, types of connections and their comparative features, Scott connection -Parallel operation of three phase transformer, Energy efficient technologies for transformers.		
TOTAL: 45 PERIODS		

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Explain the construction, working principle, parallel operation and characteristics of DC generator.
CO2:	Explain the working principle, characteristics, starting and speed control methods of DC motor.
CO3:	Develop the equivalent circuit of transformer and determine the efficiency.
CO4:	Compute various performance parameters of the machine, by conducting suitable tests.
CO5:	Explain the construction, working principle and parallel operation of Transformers

TEXT BOOKS:	
1	B.L.Theraja and A.K.Theraja,"Electrical Technology",Volume II, S.Chand & company Ltd, 2009.
2	P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2nd Edition, 2021.
REFERENCES:	
1	R.K.Rajput, "Electrical Machines", Laxmi Publications(P) Ltd, 5th Edition, 2016.
2	I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 5th Edition, 2017.
3	A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 6th Edition, 2017.
4	A. E. Clayton and N. N. Hancock, "The Performance and design of DC machines", CBS Publishers, 2018.
5	B.R.Gupta, 'Fundamental of Electric Machines' New age International Publishers,3rd Edition, Reprint 2015.

Course outcomes EE22303	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	-	-	-	-	-	-	-	1	-	-	1
CO2	3	3	1	1	-	-	-	-	-	-	-	1	-	-	1
CO3	3	3	1	1	-	-	-	-	-	-	-	1	-	-	1
CO4	3	3	1	1	-	-	-	-	-	-	-	1	-	-	1
CO5	3	3	1	1	-	-	-	-	-	-	-	1	-	-	1
CO	3	3	1	1	-	-	-	-	-	-	-	1	-	-	1

Table of Specifications for End Semester Question Paper

EE22303 DC MACHINES & TRANSFORMERS

Unit No. and Title	Total 2 Marks	Total 16 Marks	Cognitive Level			
			Remember (Re)	Understand (Un)	Apply (Ap)	Analyse(An) Evaluate(Ev)
			No. of Qns. (marks) and CO			
Unit-I: DC Generators	2	1 either or	2(2) -CO1	1 either or (16) - CO1		-
Unit-II: DC motors	2	1 either or	2(2) - CO2	1 either or (16) - CO2		-
Unit-III: Single Phase Transformer	2	1 either or	1(2) - CO3	1(2) — CO3	1 either or (16) - CO3	-
Unit-IV: Testing Of Dc Machines And Transformer.	2	I either or	1(2) - CO4	1(2) - CO4	1 either or (16) - CO4	-
Unit-V: Autotransformer And Three Phase Transformer	2	I either or	2(2) – CO5	1 either or (16) - CO5		-
Total Qns. Electrical Machines – I	10	5 either or	8(2)	2(2) 3 either or (16)	2 either or (16)	-
Total Marks	20	80	16	52	32	-
Weightage	20 %	80%	16%	52%	32%	-

Weightage for COs					
	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	20	20	20	20	20
Weightage	20%	20%	20%	20%	20%

GE3252	TAMILS AND TECHNOLOGY	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To facilitate the students to understand weaving and ceramic technology of sangam Age.
- To create an awareness on structural design of Tamils during sangam age.
- To help students to distinguish between all the levels of manufacturing technology in ancient period.
- To understand the ancient Knowledge of agriculture and irrigation technology.
- To enable the students to understand the digitalization of Tamil language.

UNIT I	WEAVING AND CERAMIC TECHNOLOGY	3

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT II	DESIGN AND CONSTRUCTION TECHNOLOGY	3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in
Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT III	MANUFACTURING TECHNOLOGY	3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

UNIT IV	AGRICULTURE AND IRRIGATION TECHNOLOGY	3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT V	SCIENTIFIC TAMIL & TAMIL COMPUTING	3

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

TOTAL: 15 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Describe the importance of weaving and ceramic technology of sangam Age.
CO2:	Illustrate the knowledge on structural design of Tamils during sangam age.
CO3:	Demonstrate a strong foundational knowledge in manufacturing technology of ancient Tamils.
CO4:	Describe the importance of ancient agriculture and irrigation technology of Tamils.
CO5:	Explain the concept of digitalization of Tamil language.

TEXT & REFERENCE BOOKS:	
1.	fzpzpj;jkpo; – Kidtu; ,y. Re;juk;. (tpfld; gpuRuk;)
2.	fPob – itif ejpf;fuapy; rq;ffhy efu ehfuPfk; (njhy;ypay; Jiw ntspaPL) / Keeladi - 'Sangam City Civilization on the banks of river Vaigai', Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.
3.	nghUie – Mw;wq;fiu ehfuPfk;. (njhy;ypay; Jiw ntspaPL) / "Porunai Civilization", Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.
4.	Dr.K.K.Pillay, Social Life of Tamils, A joint publication of TNTB & ESC and RMRL.
5.	Dr.S.Singaravelu, "Social Life of the Tamils - The Classical Period", International Institute of Tamil Studies.
6.	R.Balakrishnan, "Journey of Civilization Indus to Vaigai", RMRL.

GE3252	jkpoUk; njhopy; El;gKk;	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- rq;f fhyj;jpd; nerT kw;Wk; gPq;fhd; njhopy; El;gj;ij khzth;fs; Ghpe;Jnfhs;s trjp nra;jy;.
- rq;f fhyj; jkpoh;fspd; tbtikg;G njhopy;El;gk; gw;wpa tpopg;Gzh;it Vw;gLj;Jjy;.
- gz;ila fhy cw;gj;jp njhopy;El;gj;jpd; midj;J epiyfisAk; NtWgLj;jp mwpa khzth;fSf;F cjTjy;.
- tptrhak; kw;Wk; ePh;g;ghrd njhopy;El;gj;jpd; gz;ila mwpitg; Ghpe;Jf; nfhs;s nra;jy;.
- jkpo; nkhopapd; b[pl;ly; kakhf;fy; gw;wpg; Ghpe;Jf; nfhs;s nra;jy;.

myF I	nerT kw;Wk; ghidj; njhopy;El;gk;	3

rq;f fhyj;jpy; nerTj; njhopy; – ghidj; njhopy;El;gk; – fUg;G rptg;G ghz;lq;fs; – ghz;lq;fspy; fPwy; FwpaPLfs;.

myF II	tbtikg;G kw;Wk; fl;blj; njhopy;El;gk;	3

rq;f fhyj;jpy; tbtikg;G kw;Wk; fl;Lkhdq;fs; & rq;f fhyj;jpy; tPl;Lg; nghUl;fspy; tbtikg;G – rq;f fhyj;jpy; fl;Lkhd nghUl;fSk; eLfy;Yk; – rpyg;gjpfhuj;jpy; Nkil mikg;G gw;wpa tptuq;fs; – khky;yGur; rpw;gq;fSk;> Nfhtpy;fSk; – Nrhou; fhyj;J ngUq;Nfhapy;fs; kw;Wk; gpw topghl;Lj; jyq;fs; – ehaf;fu; fhyf; Nfhtpy;fs; – khjpup fl;likg;Gfs; fw;wp mwpjy;> kJiu kPdhl;rp mk;kd; Myak; kw;Wk; jpUkiy ehaf;fu; k`hy; – nrl;behl;L tPLfs; – gpupl;b\;; fhyj;jpy; nrd;idapy; ,e;Njh – rhNuhnrdpf; fl;blf; fiy.

myF III	cw;gj;jpj; njhopy;El;gk;	3

fg;gy; fl;Lk; fiy – cNyhftpay; – ,Uk;Gj; njhopw;rhiy – ,Uk;ig cUf;Fjy;> v/F – tuyhw;Wr; rhd;Wfshf nrk;G kw;Wk; jq;f ehzaq;fs; – ehzaq;fs; mr;rbj;jy; – kzp cUthf;Fk; njhopw;rhiyfs; – fy;kzpfs;- fz;zhb kzpfs; – RLkz; kzpfs; – rq;F kzpfs; - vYk;Gj;Jz;Lfs; – njhy;ypay; rhd;Wfs; – rpyg;gjpfhuj;jpy; kzpfspd; tiffs;.

myF IV	Ntshz;ik kw;Wk; ePu;ghrdj; njhopy;El;gk	3

miz> Vup> Fsq;fs;> kjF – Nrhou;fhyf; FKopj; J}k;gpd; Kf;fpaj;Jtk; – fhy;eil guhkupg;G – fhy;eilfSf;fhd tbtikf;fgl;l fpzWfs; – Ntshz;ik kw;Wk; Ntshz;ikr;

rhu;e;j nray;ghLfs; – fly;rhu; mwpT – kPd;tsk; – Kj;J kw;Wk; Kj;Jf;Fspj;jy; – ngUq;fly; Fwpj;j gz;ila mwpT – mwpTrhu; r%fk;.		
myF V	**mwptpay; jkpo; kw;Wk; fzpdpj;jkpo;**	**3**
mwptpay; jkpopd; tsu;r;rp – fzpdpj;jkpo; tsu;r;rp – jkpo; E}y;fis kpd;gjpg;G nra;jy; – jkpo; nkd;nghUl;fs; cUthf;fk; – jkpo; ,izaf; fy;tpf;fofk; – jkpo; kpd; E}yfk; – ,izaj;jpy; jkpo; mfuhjpfs; – nrhw;Fitj; jpl;lk;.		
TOTAL: 15 PERIODS		
COURSE OUTCOMES:		
,g;ghlj; jpl;lj;jpd; %yk; khzth;fs; ngWk; gad;fs;:		
CO1:	rq;f fhyj;jpd; nerT kw;Wk; gPq;fhd; njhopy; El;gj;jpd; Kf;fpaj;Jtj;ij tpthpf;f KbAk;.	
CO2:	rq;f fhyj; jkpoh;fspd; tbtikg;G njhopy;El;gk; gw;wpa mwpit tpsf;f KbAk;.	
CO3:	gz;ila jkpoh;fspd; cw;gj;jp njhopy;El;gk; gw;wpa tYthd mbj;js mwpit ntspg;gLj;j KbAk;.	
CO4:	jkpoh;fspd; tptrhak; kw;Wk; ePh;g;ghrd njhopy;El;gj;jpd; gz;ila mwpit tpthpf;f KbAk;.	
CO5:	jkpo; nkhopapd; b[pl;ly; kakhf;fy; gw;wpa fUj;ij tpsf;f KbAk;.	
TEXT & REFERENCE BOOKS:		
1.	fzpzpj;jkpo; – Kidtu; ,y. Re;juk;. (tpfld; gpuRuk;)	
2.	fPob – itif ejpf;fuapy; rq;ffhy efu ehfuPfk; (njhy;ypay; Jiw ntspaPL) / Keeladi - 'Sangam City Civilization on the banks of river Vaigai', Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.	
3.	nghUie – Mw;wq;fiu ehfuPfk;. (njhy;ypay; Jiw ntspaPL) / "Porunai Civilization", Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.	
4.	Dr.K.K.Pillay, Social Life of Tamils, A joint publication of TNTB & ESC and RMRL.	
5.	Dr.S.Singaravelu, "Social Life of the Tamils - The Classical Period", International Institute of Tamil Studies.	
6.	R.Balakrishnan, "Journey of Civilization Indus to Vaigai", RMRL.	

Course outcomes GE3252	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
CO	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-

EE22304	**ELECTRONIC DEVICES AND CIRCUITS**	**L**	**T**	**P**	**C**
		3	**0**	**2**	**4**

COURSE OBJECTIVES:		
• To explain the structure, characteristics and applications of diodes.		
• To explain the structure, operation and characteristics of transistors.		
• To determine the gain and frequency response of BJT and MOSFET amplifiers.		
• To construct electric circuits using diodes.		
• To construct different oscillator circuits and determine its frequency of oscillation.		
UNIT I	**PN JUNCTION DEVICES**	**9**
PN junction diode –structure, operation and V-I characteristics, Zener diode – characteristics, Display devices- LED, Laser diode, Photo diode, Photo transistor, Opto coupler- Gallium arsenide devices.		
UNIT II	**TRANSISTORS**	**9**
BJT, MOSFET, UJT and IGBT - structure, operation and characteristics, Basics of BJT biasing, SiC,GaAs.		
UNIT III	**AMPLIFIERS**	**9**
BJT -small signal model – Analysis of CE amplifiers- impedance and Gain - Frequency response with coupling and bypass capacitor. MOSFET- Small signal model– Analysis of common source and common drain amplifiers – impedance and Gain- Frequency response.		
UNIT IV	**POWER SUPPLY AND WAVE SHAPING CIRCUITS**	**9**
Half wave rectifier and full wave rectifier with and without filters, Clippers and Clampers, Zener diode based voltage regulator.		
UNIT V	**FEEDBACK AMPLIFIERS AND OSCILLATORS**	**9**
Advantages of negative feedback – voltage / current, series, Shunt feedback –positive feedback – Condition for oscillations, Phase shift, Wien bridge, Hartley, Colpitts and Crystal oscillators.		
PERIODS: 45		
List of Experiments 1. Characteristics of PN junction diode. 2. Regulation of voltage using Zener Diode. 3. Characteristics of Photo transistor. 4. Characteristics of BJT using common emitter configuration. 5. Characteristics of UJT. 6. Characteristics of half wave rectifier with and without filter. 7. Characteristics of full wave rectifier with and without filter.		
PERIODS:30		
TOTAL PERIODS:75		
COURSE OUTCOMES:		
At the end of the course, the students will be able to:		
CO1:	Explain the structure, characteristics and applications of diodes.	
CO2:	Explain the structure, operation and characteristics of transistors.	
CO3:	Determine the gain and frequency response of BJT and MOSFET amplifiers.	
CO4:	Construct electronic circuits using diodes.	
CO5:	Explain different oscillator circuits and determine its frequency of oscillation.	
TEXT BOOKS:		
1	David A. Bell, ”Electronic devices and circuits”, Oxford University higher education, 5th edition 2008.	
2	Robert L.Boylestad, “Electronic devices and circuit theory”, 11th edition,	

	Pearson prentice Hall 2013.
REFERENCES:	
1	Thomas L.Floyd, "Electronic devices" Conventional current version, Pearson prentice hall, 10th Edition, 2017.
2	Donald A Neamen, "Electronic Circuit Analysis and Design" Tata McGraw Hill, 3rd Edition, 2003.
3	Salivahanan S and Suresh Kumar N, "Electronic devices and Circuits", Mc Graw Hill Education, Fourth Edition.
4	Robert B. Northrop, "Analysis and Application of Analog Electronic Circuits to Biomedical Instrumentation", CRC Press, Second edition, 2012.
5	Sedra and smith, "Microelectronic circuits",7th Edition., Oxford University Press, 2017.

Course outcomes EE22304	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-		1	-	1	-
CO2	2	-	-	-	-	-	-	-	-	-		1	-	1	-
CO3	2	2	1	1	-	-	-	-	-	-		1	-	1	-
CO4	2	2	1	-	-	-	-	-	-	-		1	-	2	-
CO5	2	2	1	-	-	-	-	-	-	-		1	-	1	-
CO	2	2	1	1	-	-	-	-	-	-		1	-	1	-

Table of Specifications for End Semester Question Paper

EE22304 ELECTRONIC DEVICES AND CIRCUITS

Unit No. and Title	Total 2 Marks	Total 16 Marks	Cognitive Level			
			Remember (Re)	Understand (Un)	Apply (Ap)	Analyse(An)
			No. of Qns. (marks) and CO			
Unit-I: Pn Junction Devices	2	1 either or	2(2) – CO1	2 either or (16) – CO1	-	-
Unit-II: Transistors	2	1 either or	2(2) - CO2	2 either or (16) — CO2	-	-
Unit-III Amplifiers	2	1 either or	2 (2) — CO3	2 either or (16) — CO3	-	-
Unit-IV Power Supply and Wave Shaping Circuits	2	I either or	2(2) - CO4	1 either or (16) — CO4	1 either or (16) — CO4	-
Unit-V: Feedback Amplifiers and Oscillators	2	I either or	2(2) – CO5	1 either or (16) — CO5	1 either or (16) — CO5-	-
Total Qns.	10	5 either or	10(2)	3 either or (16)	2 either or (16)	-
Total Marks	20	80	20	48	32	-
Weightage	20 %	80%	20%	60%	20%	-

Weightage for COs					
	CO1	**CO2**	**CO 3**	**CO4**	**CO5**
Total Marks	20	20	20	20	20
Weightage	20%	20%	20%	20%	20%

EE22305	**DC MACHINES & TRANSFORMERS LABORATORY**	**L**	**T**	**P**	**C**
		0	**0**	**4**	**2**

COURSE OBJECTIVES:

- To expose the students to determine the characteristics of DC machines and transformers by performing experiments on these machines.
- To provide hands on experience to evaluate the performance parameters of DC machines and transformer by conducting suitable tests.

List of Experiments

1. Load test on DC shunt motor.
2. Load test on DC compound motor.
3. Load test on DC series motor.
4. Swinburne's test
5. Speed control of DC shunt motor.
6. Load test on single-phase transformer and three phase transformers.
7. Open circuit and short circuit tests on single phase transformer.
8. Separation of no-load losses in single phase transformer.
9. Study of starters and 3-phase transformers connections.
10. Dismantle and assemble a DC motor.
11. Dismantle and assemble a Transformer.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Experimentally determine the characteristics of different types of DC machines.
CO2:	Demonstrate the speed control techniques for a DC motor for industrial applications.
CO3:	Identify suitable methods for testing and find the performance parameters of transformer and DC machines.
CO4:	Experimentally determine the performance of single phase and 3-phase transformer under various load conditions.
CO5:	Understand the parts, connections, starters of DC motor and transformer .

Course outcomes EE22305	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	-	1	-	-	-	-	1	-	-	-	-	-	1

CO2	3	3	-	1	-	-	-	-	1	-	-	-	-	-	1
CO3	3	3	-	1	-	-	-	-	1	-	-	-	-	-	1
CO4	3	3	-	1	-	-	-	-	1	-	-	-	-	-	1
CO5	3	3	-	1	-	-	-	-	1	-	-	-	-	-	1
CO	3	3	-	1	-	-	-	-	1	-	-	-	-	-	1

LAB REQUIREMENTS

Sl.No	Description of Equipment	Required numbers (for 30 students)
1	DC Shunt Motor with Loading Arrangement	3 Nos
2	DC Series Motor with Loading Arrangement	1 Nos
3	DC compound Motor with Loading Arrangement	1Nos
4	Single Phase Transformer	5Nos
5	Three Phase Transformer	1No
6	Tachometer -Digital/Analog	8Nos
7	Single Phase Auto Transformer	3Nos
8	Three Phase Auto Transformer	1 No.
9	Single Phase Resistive Loading Bank	2Nos
10	Single Phase Inductive Loading Bank	2Nos
11	Three Phase Resistive Loading Bank	2Nos
12	Ammeter, Voltmeter, Wattmeter in different ranges	10 Nos
13	Rheostats	10 Nos
14	Connecting wires	As required

SD22302	**CODING SKILLS AND SOFT SKILLS TRAINING – PHASE I**	**L**	**T**	**P**	**C**
		0	0	4	2

COURSE OBJECTIVES:

- To make the students to solve basic programming logics.
- To help the students develop logics using decision control statements.
- To make them develop logics using looping statements and arrays and help them get started with embedded systems programming.
- To train the students for effective communication and identify the common errors in formal writings
- . To guide and motivate the students for setting their goals with positive thinking.

UNIT I	**FUNDAMENTALS IN PROGRAMMING**	**8**

Output of Programs: I/O Functions, Data types, Constants, Operators – Mathematical Problems – Debugging – Puzzles - Company Specific Programming Examples.

UNIT II	**DECISION CONTROL STATEMENTS**	**8**

Logic Building Using Conditional Control Statements – Output of Programs – Mathematical Problems - Puzzles – Company Specific Programming Examples

UNIT III	**LOOPING STATEMENTS & C PROGRAMMING FOR EMBEDDED APPLICATIONS**	**14**

Looping Statements: Number Programs – Programs on Patterns – Array Programs – Programs on Sorting and Searching - Matrix Programs – Puzzles - Output of Programs - Company Specific Programming Examples

C Programming for Embedded Applications: Getting Started in Embedded Systems – A quick analysis of memory usage with Keil – Bit Manipulation – A Bit Field Example with Keil

UNIT IV	**COMMUNICATION IN GENERAL**	**15**

Introduction to communication-Types of communication – Effective Communication-Barriers to communication. Language Study: Vocabulary-Formation of sentences-Sentence and sentence structures-Common errors – Writing paragraphs & essays. Professional writing: Job application & Resume writing

UNIT V	**PERSONALITY DEVELOPMENT**	**15**

Study of personality & ways to improve. Soft Skills: Self-evaluation / self-awareness – Goal setting and positive thinking – Self-esteem and confidence – Public speaking – Extempore – Body language and Observation skills

TOTAL: 45 PERIODS

Suggestive Assessment Methods:

1) Pre Assessment Test – To check the student's previous knowledge in Programming skills.

2) Internal Assessment I for coding skills will be conducted for 100 marks which are then calculated to 20.

3) Internal Assessment II for coding skills will be conducted for 100 marks which are then calculated to 20.

4) Model Exam for coding skills will be conducted for 100 marks which are then calculated to 20. 2

5) A test for Communication skills will be conducted for 100 marks which will be then calculated to 40.

6) For assignments, students should attend all the practice tests conducted online on Hacker Rank. Each assignment will be for 100 marks and finally the total marks obtained by a student in all tests will be reduced to 40 marks.

7) The total of 100 marks obtained from the tests will be then calculated to 60 marks and additional of 40 marks will be given for assignments which will make it a total of 100.

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Solve problems on basic I/O constructs.
CO2:	Develop problem solving skills using control statements and arrays
CO3:	Develop basic embedded system applications.
CO4:	Avoid / fix the common errors they commit in academic and professional writings and prepare standard resumes and update the same for future career.
CO5:	Recognize the value of self-evaluation and grow with self-confidence.

TEXT BOOKS:

1.	Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2.	Kernighan, B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2015.

REFERENCES:

1.	Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013.
2.	Paul Deitel and Harvey Deitel, "C How to Program with an Introduction to C++",

	Eighth edition, Pearson Education, 2018.
3.	E Balagurusamy, "Programming in ANSI C", Eighth edition, Mc GrawHill Publications, 2019.
4.	S.Sobana, R.Manivannan, G.Immanuel, "Communication and Soft Skills" VK Publications', 2016
5.	Elecia White, "Making Embedded Systems: Design Patterns for Great Software", O'Reilly Publications, 2011.

Course outcomes SD22302	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	1	1	1	-	-	-	1	2	-	-	-
CO2	3	2	2	-	1	1	1	-	-	-	1	2	-	-	-
CO3	3	2	2	-	1	1	1	-	-	-	1	2	1	2	-
CO4	-	-	-	-	-	-	-	1	2	3	-	2	-	-	-
CO5	-	-	-	-	-	-	-	1	2	3	-	2	-	-	-
CO	3	2	2	-	1	1	1	1	2	3	1	2	1	2	-

AC22301	**CONSTITUTION OF INDIA**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**0**

COURSE OBJECTIVES:

- Teach history and philosophy of Indian Constitution.
- Describe the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- Summarize powers and functions of Indian government.
- Explain emergency rule.
- Explain structure and functions of local administration.

UNIT I	**INTRODUCTION**	**6**

History of Making of the Indian Constitution - Drafting Committee - Philosophy of the Indian Constitution - Preamble - Salient Features.

UNIT II	**CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES**	**6**

Fundamental Rights - Right to Equality - Right to Freedom - Right against Exploitation - \Right to Freedom of Religion - Cultural and Educational Rights - Fundamental Duties.

UNIT III	**ORGANISATIONS OF GOVERNANCE**	**7**

Parliament - Composition - Qualifications and Disqualifications - Powers and Functions - Executive President - Governor - Council of Ministers - Judiciary, Appointment and Transfer of Judges - Qualifications, Powers and Functions.

UNIT IV	EMERGENCY PROVISIONS	4
Emergency Provisions - National Emergency, President Rule, Financial Emergency.		
UNIT V	**LOCAL ADMINISTRATION**	**7**
District's Administration head - Role and Importance -Municipalities - Introduction- Mayor and role of Elected Representative - CEO of Municipal Corporation -Pachayati raj - Introduction - PRI- Zila Pachayat-Elected officials and their roles.		
TOTAL: 45 PERIODS		

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Understand history and philosophy of Indian Constitution.
CO2:	Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
CO3:	Understand powers and functions of Indian government.
CO4:	Understand emergency rule.
CO5:	Understand structure and functions of local administration.

TEXT BOOKS:	
1.	Basu D D, Introduction to the Constitution of India, Lexis Nexis, 2015.
2.	Busi S N, Ambedkar B R framing of Indian Constitution, 1st Edition, 2015.

REFERENCES:	
1.	Jain M P, Indian Constitution Law, 7th Edn, Lexis Nexis, 2014.
2.	The Constitution of India (Bare Act), Government Publication, 1950.
3.	M.V.Pylee, "Introduction to the Constitution of India", 4th Edition, Vikas publication, 2005.
4.	Durga Das Basu (DD Basu), "Introduction to the constitution of India", (Student Edition), 19th Edition, Prentice-Hall EEE, 2008.
5.	Merunandan, "Multiple Choice Questions on Constitution of India", 2nd Edition, Meraga publication, 2007.

Course outcomes AC22301	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	-	-	1	1	-	1	-	-	-	1	-	-	-
CO2	-	1	1	-	-	1	-	1	-	1	-	-	-	-	-
CO3	-	1	1	-	-	1	-	1	-	1	-	-	-	-	-
CO4	-	-	-	1	-	-	1	-	1	1	1	1	-	-	-
CO5	-	-	1	-	-	-	1	-	-	1	-	1	-	-	-
CO	-	1	1	1	1	1	1	1	1	1	1	1	-	-	-

HS22301	VALUE EDUCATION – I	L	T	P	C
		1	0	0	0

COURSE OBJECTIVES:		
• To give the students a deeper understanding about the purpose of life.		
• To animate the students to have a noble vision and a right value system for their life.		
• To help the students to set short term and long-term goals in their life.		
UNIT I	**MY LIFE AND MY PLACE IN THE UNIVERSE**	**4**
Value of my life – My Uniqueness, strengths and weakness – My self-esteem and confidence – My identity in the universe.		
UNIT II	**MY LIFE AND THE OTHER**	**4**
Realising the need to relate with other persons and nature – My refined manners and conduct in relationships – Basic communication and relationship skills – Mature relationship attitudes.		
UNIT III	**MY LIFE IS MY RESPONSIBILITY**	**3**
Personal autonomy – developing a value system and moral reasoning skills – setting goals for life.		
UNIT IV	**UNDERSTANDING MY EDUCATION AND DEVELOPING MATURITY**	**4**
Importance of my Engineering education – Managing emotions - personal problem solving skills.		
		TOTAL: 45 PERIODS

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Explain the importance of value based living.
CO2:	Set realistic goals and start working towards them.
CO3:	Apply the interpersonal skills in their personal and professional life.
CO4:	Emerge as responsible citizens with a clear conviction to be a role model in the society.

REFERENCES:	
1.	David Brooks. The Social Animal: The Hidden Sources of Love, Character, and Achievement. Random House, 2011.
2.	Mani Jacob. Resource Book for Value Education. Institute of Value Education, 2002.
3.	Eddie de Jong. Goal Setting for Success. CreateSpace Independent Publishing, 2014.
4.	Dr.Abdul kalam. My Journey-Transforming Dreams into Actions. Rupa Publications, 2013.

Course outcomes HS22301	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	-	1	1	2	-	2	-	1	-
CO2	-	-	-	-	-	2	-	1	1	2	-	2	-	1	-
CO3	-	-	-	-	-	2	-	1	1	2	-	2	-	1	-
CO4	-	-	-	-	-	2	-	1	1	2	-	2	-	1	-
CO5	-	-	-	-	-	2	-	1	1	2	-	2	-	1	-
CO	-	-	-	-	-	2	-	1	1	2	-	2	-	1	-

SEMESTER IV

EE22401	GENERATION, TRANSMISSION AND DISTRIBUTION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To explain the process of power generation.
- To determine transmission line parameters for various configurations.
- To determine the performance of different transmission lines.
- To understand the concepts of insulators and cables.
- To understand the distribution system and its classification.

UNIT I POWER GENERATION **9**

Generation of electrical power by conventional sources of energy- Schematic arrangement, operation, advantages and disadvantages-Thermal, Nuclear, Hydroelectric and Diesel Power plants.

UNIT II TRANSMISSION LINE PARAMETERS **9**

Structure of electric power system - Parameters of single and three phase transmission lines with single and double circuits -Resistance, inductance, and capacitance of solid, stranded, and bundled conductors - Typical configuration, conductor types - Symmetrical and unsymmetrical spacing and transposition – application of self and mutual GMD; skin and proximity effects - Effects of earth on the capacitance of the transmission line.

UNIT III MODELLING AND PERFORMANCE OF TRANSMISSION LINES **9**

Performance of Transmission lines – short line, medium line and long line – equivalent circuits, phasor diagram, attenuation constant, phase constant, surge impedance – transmission efficiency and voltage regulation, real and reactive power flow in lines –ABCD Constants- Ferranti effect – Formation of Corona –Sag in overhead Transmission Lines.

UNIT IV INSULATORS AND CABLES **9**

Overhead line insulators -Types of Insulators – Potential distribution over insulator string – Methods of Improving String Efficiency.

Underground cables – Types of cables – Construction of single-core and 3-core belted cables – Insulation Resistance – Potential Gradient – Capacitance of single-core and 3-core belted cables – Grading of cables.

UNIT V DISTRIBUTION SYSTEMS **9**

Distribution Systems – General Aspects – Kelvin's Law – AC and DC distributions – Concentrated and Distributed loading- Distribution Loss – Types of Substations.

TOTAL PERIODS:45

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Explain the process of power generation.
CO2:	Calculate transmission line parameters under various configurations.
CO3:	Determine the performance of different transmission lines.
CO4:	Explain the concepts in insulators and cables.
CO5:	Explain distribution system and its classifications.

TEXT BOOKS:

1	V.K.Mehta, Rohit Mehta, 'Principles of power system', S. Chand & Company Ltd, New Delhi, 2013.
2	S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2008.

REFERENCES:

1	Anthony J. Pansini, Power Transmission and Distribution, 2nd Edition, , The

	Fairmont Press Publishers, Inc,2004
2	B.L.Theraja, A Textbook of Electrical Technology Volume III -Transmission and Distribution, Chand (S.) & Co Ltd,2007
3	C.L.Wadhwa, 'Electrical Power Systems', New Age International Ltd, seventh edition 2022.
4	R.K.Rajput, 'A Text Book of Power System Engineering' 2nd edition, Laxmi Publications (P) Ltd, New Delhi, 2016
5	Leonard L. Grigsby, "Electric Power Generation, Transmission, and Distribution,2nd Edition CRC Press 2006.

Course outcomes EE22401	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	1	-	-	-	-	1	-	-	2	2	-	-
CO2	3	2	-	1	-	-	-	-	1	-	-	2	2	-	-
CO3	3	2	-	1	-	-	-	-	1	-	-	2	2	-	-
CO4	3	2	-	1	-	-	-	-	1	-	-	2	2	-	-
CO5	3	2	-	1	-	-	-	-	1	-	-	2	2	-	-
CO	3	2	-	1	-	-	-	-	1	-	-	2	2	-	-

Table of Specification for End Semester Question Paper

EE22401 – GENERATION TRANSMISSION AND DISTRIBUTION

Unit No. and Title	Total 2 Marks	Total 16 Marks	Cognitive Level			
			Remember (Re)	Understand (Un)	Apply (Ap)	Analyse (An)
			No. of Qns. (marks) and CO			
Unit-I: Power Generation	2	1 either or	2(2) – CO1	1 either or (16) - CO1	-	-
Unit-II: Transmission Line Parameters	2	1 either or	1(2) - CO2	1(2) — CO2	1 either or (16) - CO2	-
Unit-III: Modelling and Performance of Transmission Lines	2	1 either or	1(2) — CO3	1(2) — CO3	1 either or (16) - CO3	-
Unit-IV: Insulators and Cables	2	1 either or	1(2) - CO4	1(2) - CO4 1 either or (16) - CO4	-	-

Unit-V: Distribution Systems	2	1 either or	1(2) – CO5	1(2) – CO5 1 either or (16) - CO5	-	-
Total Qns.	10	5 either or	6(2)	4(2) 3 either or (16)	2 either or (16)	-
Total Marks	20	80	12	56	32	-
Weightage	20 %	80%	12%	56%	32%	-

Weightage for COs					
	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	20	20	20	20	20
Weightage	20%	20%	20%	20%	20%

EE22402	**AC MACHINES**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES:

- To explain the construction, principle of operation and performance of three phase induction machine.
- To explain the starting and speed control of three-phase induction motors.
- To explain the construction, principle of operation and performance of single phase induction machine.
- To find the voltage regulation and characteristics of synchronous machines.
- To explain the construction and principle of operation of special electrical machines.

UNIT I	**THREE PHASE INDUCTION MOTOR**	**9**

Constructional details – Types of rotors –- Principle of operation – Slip –cogging and crawling-Equivalent circuit – Torque-Slip characteristics - Condition for maximum torque – Losses and efficiency – Load test - No load and blocked rotor tests.

UNIT II	**STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR** .	**9**

Need for starting – Types of starters – DOL, Rotor resistance, Autotransformer and Star delta starters – Speed control – Voltage control, Frequency control and pole changing –V/f control – Slip power recovery Scheme-Braking of three phase induction motor: Plugging, dynamic braking and regenerative braking.

UNIT III	**SINGLE PHASE INDUCTION MOTORS**	**9**

Principle of operation -Construction -Types-double revolving field theory, equivalent circuit-No load and blocked rotor test- Applications.

UNIT IV	**SYNCHRONOUS MACHINES**	**9**

SYNCHRONOUS GENERATOR: Constructional details-types of rotors-emf equations-synchronous reactance-armature reaction-EMF, MMF and ZPF-Basics of Two reaction theory.

SYNCHRONOUS MOTOR : Principle of operation and characteristics- V and Inverted V curves - Starting methods -Hunting – damper windings- synchronous condenser.

UNIT V	**SPECIAL ELECTRICAL MACHINES**	**9**

Construction- principle of operation - characteristics of BLDC motor- Construction - principle of operation - characteristics of stepper motor-Applications

	TOTAL: 45 PERIODS
COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Explain the construction, working principle and performance of three phase induction motor.
CO2:	Compare the different starting and speed control methods of three phase induction motors.
CO3:	Explain the construction, working principle and performance of single phase induction motor.
CO4:	Determine the voltage regulation and characteristics of synchronous machines.
CO5:	Explain the construction and working principle of special electrical machines.
TEXT BOOKS:	
1	P.S. Bhimbhra, 'Electrical Machinery', Khanna Publishers, 2nd edition, 2021
2	B.L.Theraja, A.K.Theraja' A Text Book of Electrical Technology', S.Chand Publishers, Volume-II, 23rd edition 2020.
REFERENCES:	
1	D.P. Kothari and I.J. Nagrath, 'Electric Machines', McGraw Hill Publishing Company Ltd,5th Edition 2017
2	B.R.Gupta, 'Fundamental of Electric Machines' New age International Publishers,3rd Edition, Reprint 2015.
3	A.E. Fitzgerald, Charles Kingsley, Stephen. D. Umans, 'Electric Machinery', Mc Graw Hill publishing Company Ltd, 6th Education 2017.
4	Stephen J. Chapman, 'Electric Machinery Fundamentals'4th edition, McGraw Hill Education Pvt. Ltd, 4th Edition 2017.
5	Vincent Del Toro, 'Basic Electric Machines' Pearson India Education, 2016.

Course outcomes EE22402	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1	1	-	-	1	-	-	-	-	1	-	-	1
CO2	3	3	1	1	-	-	1	-	-	-	-	1	-	-	1
CO3	3	3	1	1	-	-	1	-	-	-	-	1	-	-	1
CO4	3	3	1	1	-	-	1	-	-	-	-	1	-	-	1
CO5	3	3	1	1	-	-	1	-	-	-	-	1	-	-	1
CO	3	3	1	1	-	-	1	-	-	-	-	1	-	-	1

Table of Specification for End Semester Question Paper

Unit No. and Title	Total 2 Marks	Total 16 Marks	Cognitive Level			
			Remember (Re)	Understand (Un)	Apply (Ap)	Analyse (An)
			No. of Qns. (marks) and CO			
Unit-I: Three Phase Induction Motor	2	1 either or	1(2) – CO1	1(2) — CO1 1 either or (16) - CO1	-	-
Unit-II: Starting And Speed Control Of Three Phase Induction Motor .	2	1 either or	1(2) - CO2	1(2) — CO2 1 either or (16) - CO2	-	-
Unit-III: Single Phase Induction Motors	2	1 either or	1(2) — CO3	1(2) — CO3 1 either or (16) - CO3	-	-
Unit-IV: Synchronous Machines	2	1 either or	2(2) - CO4	-	1 either or (16) - CO4	-
Unit-V: Special Electrical Machines	2	1 either or	2(2) – CO5	1 either or (16) - CO5	-	-
Total Qns. Title	10	5 either or	7(2)	3(2) 4 either or (16)	1 either or (16)	-
Total Marks	20	80	14	70	16	-
Weightage	20 %	80%	14%	70%	16%	-

Weightage for COs					
	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	20	20	20	20	20
Weightage	20%	20%	20%	20%	20%

EE22403	**CONTROL SYSTEMS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES:

- To familiarize about linear time invariant systems.
- To determine the stability of linear systems in time domain.
- To determine the stability of linear systems in frequency domain.
- To develop state variable model of time invariant systems.
- To design compensators for feedback control systems.

UNIT I	**MODELING OF LINEAR TIME INVARIANT SYSTEM**	**9**

Control system: Open loop and Closed loop – Feedback control system characteristics – First principle modeling: Mechanical, Electrical – Transfer function representations: AC and DC servomotors-Block diagram and Signal flow graph.

UNIT II	**TIME DOMAIN ANALYSIS**	**9**

Standard test inputs – Time responses – Time domain specifications. Stability analysis: Concept of stability – Routh Hurwitz stability criterion – Root locus- Effect of adding poles

and zeros.		
UNIT III	**FREQUENCY DOMAIN ANALYSIS**	**9**
Bode plot, Polar plot and Nyquist plot: – Frequency domain specifications Introduction to closed loop Frequency Response. Effect of adding lag and lead compensators.		
UNIT IV	**STATE VARIABLE ANALYSIS**	**9**
State variable formulation – Non uniqueness of state space model – State transition matrix – Eigen values – Eigen vectors- Free and forced responses for Time Invariant System– Controllability – Observability.		
UNIT V	**DESIGN OF FEED BACK CONTROL SYSTEM**	**9**
Design specifications – Lead, Lag and Lag-lead compensators using Bode plot –PID controller-Design using reaction curve and Ziegler-Nichols technique- PID control in state feedback form.		
		TOTAL: 45 PERIODS

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Develop transfer function model of linear time invariant system
CO2:	Determine the stability of linear systems in time domain.
CO3:	Determine the stability of linear systems in frequency domain.
CO4:	Find the state variable model of time invariant and time variant systems.
CO5:	Design compensators for feedback control systems.

TEXT BOOKS:	
1	M.Gopal, "Control System: Principle and design", McGraw Hill Education, 2012.
2	Nagarath, I.J. and Gopal, M., "Control Systems Engineering", New Age International Publishers, 2021.

REFERENCES:	
1	Richard C. Dorf and Bishop, R.H., "Modern Control Systems", Education Pearson, 3 Impression 2009.
2	Katsuhiko Ogata, "Modern Control Engineering", PHI Learning Private Ltd, 5thEdition, 2010
3	Benjamin C. Kuo, "Automatic Control Systems", 7th edition PHI Learning Private Ltd, 2010.
4	Nagoor Kani, "Control systems", 5th Edition, CBS publishers and distributers, 2020
5	NPTEL Video Lecture notes on "Control Engineering" by Prof.S.D.Agashe, IIT Bombay.

Course outcomes EE22403	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**

CO1	3	1	3	1	-	-	-	-	-	-	-	1	-	-	2
CO2	3	3	3	1	-	-	-	-	-	-	-	1	-	-	2
CO3	3	3	3	1	-	-	-	-	-	-	-	1	-	-	2
CO4	3	1	3	1	-	-	-	-	-	-	-	2	-	-	2
CO5	3	1	3	1	-	-	-	-	-	-	-	2	-	-	2
CO	3	2	3	1	-	-	-	-	-	-	-	1	-	-	2

Table of Specification for End Semester Question Paper

EE22403 CONTROL SYSTEMS

Unit No. and Title	Total 2 Marks	Total 16 Marks	Cognitive Level			
			Remember (Re)	Understand (Un)	Apply (Ap)	Analyse(An) Evaluate(Ev)
			No. of Qns. (marks) and CO			
Unit-I: Modeling of Linear Time Invariant System	2	1 either or	1(2) – CO1	1(2) – CO1	1 either or (16) – CO1	-
Unit-II: Time Domain Analysis	2	1 either or	1(2) - CO2	1(2) - CO2	1 either or (16) — CO2	-
Unit-III: Frequency Domain Analysis	2	1 either or	1(2) — CO3	1(2) — CO3	1 either or (16) — CO3	-
Unit-IV: State Variable Analysis	2	I either or	1(2) - CO4	1(2) - CO4	1 either or (16) — CO4	-
Unit-V: Design Of Feed Back Control System	2	I either or	1(2) – CO5	1(2) – CO5	1 either or (16) — CO5	-
Total Qns. CONTROL SYSTEMS	10	5 either or	5(2)	5(2)	5 either or (16)	-
Total Marks	20	80	10	10	80	-
Weightage	20 %	80%	10%	10%	80%	-

Weightage for COs					
	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	20	20	20	20	20
Weightage	20%	20%	20%	20%	20%

EE22404	DIGITAL LOGIC CIRCUITS	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES:

- To examine the different number system and logic gates.
- To apply K-maps for the implementation of combinational circuits.
- To illustrate the application of sequential circuits using flip-flops.
- To design the synchronous sequential circuits.
- To learn the different logic families and logic devices.

UNIT I	NUMBER SYSTEMS AND BOOLEAN ALGEBRA	9

Review of Number system - number system conversion - binary codes - error detection and corrections codes - Boolean algebra: De-Morgan's theorem - logic gates – NAND and NOR implementation.

UNIT II	COMBINATIONAL CIRCUITS	9

SOP and POS forms – K map representations - minimization using K maps - combinational logic circuits: adder, subtractor, multiplexers and demultiplexers, code converters.

UNIT III	SEQUENTIAL CIRCUITS	9

Types of Triggering - SR, JK, D and T flip flops – Flip flop realization - counters – design of synchronous and asynchronous counters - Shift registers

UNIT IV	SEQUENTIAL CIRCUITS DESIGN	9

Classification of Sequential Circuits: Moore and Mealy Model, design and analysis of synchronous sequential Circuits – state diagram, state reduction, state assignment, hazards in digital circuits.

UNIT V	DIGITAL LOGIC FAMILIES AND PROGRAMMABLE LOGIC DEVICES	9

Operation and characteristics of digital logic families: RTL, DTL, TTL, ECL and MOS. Programmable Logic Devices: PLA, PAL, GAL FPGA

45 PERIODS

LAB COMPONENT

1. Implementation of Boolean Functions, Adder and Subtractor circuits.
2. Implementation of code converters using logic gates.
3. Implementation of encoders and encoders using logic gates.
4. Design and implementation of 3-bit modulo counters in synchronous and asynchronous mode.
5. Design and implementation of 4-bit shift registers using suitable IC's.

30 PERIODS

TOTAL: 75 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Examine the different number system and logic gates.
CO2:	Apply K-maps for the implementation of combinational circuits.
CO3:	Illustrate the application of sequential circuits using flip-flops.
CO4:	Design the synchronous sequential circuits.
CO5:	Explain the operation of digital logic families and programmable logic devices.

TEXT BOOKS:

1	M. Morris Mano, "Digital Logic and Computer Design", Pearson India Education Services Pvt. Ltd., New Delhi, 2016.
2	R. P. Jain, "Modern Digital Electronics", 4th Edition, Tata McGraw Hill Education

	Pvt Ltd., 2010.
REFERENCES:	
1	S. Salivahanan, S. Arivazhagan, "Digital Circuits and Design" 5th Edition, Oxford University Press, 2019.
2	Raj Kamal, "Digital Systems: Principles and Design", 3rd Edition, Pearson Education Limited, 2009.
3	Donald D.Givone, 'Digital Principles and Design', Tata McGraw Hill,1st Edition, 2003
4	David J. Comer, "Digital Logic & State Machine Design", Oxford University Press, 2012.
5	Tocci R.J., Neal S. Widmer, 'Digital Systems: Principles and Applications', Pearson Education Asia, 12th Edition, 2017.
6	Donald P Leach, Albert Paul Malvino, Goutam Sha, 'Digital Principles and Applications', Tata McGraw Hill, 7th Edition, 2010.

Course outcomes EE22404	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	1	-	1	-
CO2	3	-	-	-	-	-	-	-	-	-	-	1	-	1	-
CO3	3	2	3	2	-	-	-	-	-	-	-	1	-	1	-
CO4	3	2	3	2	-	-	-	-	-	-	-	1	-	1	-
CO5	3	2	-	-	-	-	-	-	-	-	-	1	-	1	-
CO	3	2	3	-	-	-	-	-	-	-	-	1	-	1	-

Table of Specification for End Semester Question Paper

EE22404 DIGITAL LOGIC CIRCUITS

Unit No. and Title	Total 2 Marks	Total 16 Marks	Cognitive Level			
			Remember (Re)	Understand (Un)	Apply (Ap)	Analyse(An) Evaluate(Ev)
			No. of Qns. (marks) and CO			
Unit-I: Number Systems and Boolean Algebra	2	1 either or	2(2) – CO1	-	1 either or (16) - CO1	-
Unit-II: Combinational Circuits	2	1 either or	1(2) - CO2	1(2) - CO2	1 either or (16) - CO2	-
Unit-III: Sequential	2	1 either or	1(2) - CO3	1(2) - CO3 1 either or	-	-

Circuits				(16) - CO3		
Unit-IV: Sequential Circuits Design	2	1 either or	1(2) - CO4	1(2) - CO4	1 either or (16) - CO4	-
Unit-V: Digital Logic Families and Programmable Logic Devices	2	1 either or	2(2) - CO5	1 either or (16) - CO4	-	-
Total Qns.	10	5 either or	7(2)	3(2) 2 either or(16)	3 either or (16)	-
Total Marks	20	80	14	38	48	-
Weightage	20 %	80%	14%	38%	48%	-

Weightage for COs

	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	20	20	20	20	20
Weightage	20%	20%	20%	20%	20%

EE22405	**LINEAR INTEGRATED CIRCUITS**	**L**	**T**	**P**	**C**
		3	**0**	**2**	**4**

COURSE OBJECTIVES:

- To explain the fabrication of monolithic ICs.
- To explain the characteristics and basic applications of Op-Amp.
- To employ Op-Amp based circuits for different applications.
- To explain functional blocks, characteristics and applications of special IC's
- To explain the functional blocks, characteristics of application IC's.

UNIT I **IC FABRICATION** **9**

IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Isolation techniques, Metallization, Assembly processing and packaging. Fabrication of diodes, capacitance, resistance, FETs and PV Cell.

UNIT II **CHARACTERISTICS OF OPAMP** **9**

Ideal OP-AMP characteristics, differential amplifier; DC characteristics, AC characteristics, frequency response of OP-AMP- Voltage-shunt feedback: inverting amplifier - Voltage series feedback: Non-inverting Amplifier - Basic applications of op-amp - summer, differentiator and integrator-V/I & I/V converters.

UNIT III **APPLICATIONS OF OPAMP** **9**

Instrumentation amplifier and its applications for transducer Bridge, first and second order active Butterworth filters, comparators, multivibrators, waveform generators, peak detector, S/H circuit, D/A converter (R- 2R ladder and weighted resistor types), A/D converters (Successive Approximation type, Integrating type).

UNIT IV **SPECIAL ICs** **9**

Functional block, characteristics of 555 Timer and its PWM application – IC 566 voltage controlled oscillator- IC 565 phase locked loop.

UNIT V **APPLICATION ICs** **9**

IC voltage regulators –LM78XX, LM79XX; Fixed voltage regulators its application as Linear power supply - LM317, IC723 Variable voltage regulators, switching regulator-

SMPS - ICL 8038 function generator IC.	
TOTAL: 45 PERIODS	
List of experiments	
1. Design inverting, non-inverting amplifiers and voltage follower using Op-Amp.	
2. Design differentiator and integrator using Op-Amp.	
3. Design an adder circuit using Op-Amp	
4. Design Astable and Monostable multivibrator circuit using NE/SE 555 timer in operation.	
5. Design voltage regulator circuit using IC LM317.	
6. Generate sine waveform by using a Wien bridge oscillator circuit.	
30 PERIODS	
TOTAL: 75 PERIODS	
COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Explain the fabrication of monolithic ICs.
CO2:	Explain the characteristics and basic applications of Op-Amp.
CO3	Employ Op-Amp based circuits for different applications.
CO4:	Explain functional blocks, characteristics and applications of special IC's
CO5:	Explain the functional blocks, characteristics of Application IC's .
TEXT BOOKS:	
1	D. Roy Choudhary, Sheil B. Jani, 'Linear Integrated Circuits' , New Age, Fourth Edition, 2018.
2	David A. Bell, 'Op-amp & Linear ICs', Oxford, Third Edition, 2011
REFERENCES:	
1	Fiore,"Opamps& Linear Integrated Circuits Concepts & applications", Cengage, 2010.
2	Floyd ,Buchla,"Fundamentals of Analog Circuits, Pearson, 2013.
3	Jacob Millman, Christos C.Halkias, 'Integrated Electronics - Analog and Digital circuits system', McGraw Hill, 2 nd Edition, 2017.
4	Robert F.Coughlin, Fredrick F. Driscoll, 'Op-amp and Linear ICs', Pearson, 6th edition,2012.
5	Sergio Franco, 'Design with Operational Amplifiers and Analog Integrated Circuits', McGraw Hill, 2016 – Fourth Edition.

Course outcomes EE22405	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2	-	-	-	-	-	-	-	-	1	-	2	-
CO2	3	1	2	-	-	-	-	-	-	-	-	1	-	2	-
CO3	3	1	2	-	-	-	-	-	-	-	-	1	-	2	-
CO4	3	1	2	-	-	-	-	-	-	-	-	1	-	2	-
CO5	3	1	2	-	-	-	-	-	-	-	-	1	-	2	-
CO	3	1	2	-	-	-	-	-	-	-	-	1	-	2	-

Table of Specifications for End Semester Question Paper

EE22405 LINEAR INTEGRATED CIRCUITS

Unit No. and Title	Total 2 Marks	Total 16 Marks	Cognitive Level			
			Remember (Re)	Understand (Un)	Apply (Ap)	Analyse(An)
			No. of Qns. (marks) and CO			
Unit-I: IC Fabrication	2	1 either or	2(2) – CO1	1 either or (16) – CO1	-	-
Unit-II: Characteristics of Opamp	2	1 either or	2(2) - CO2	1 either or (16) – C02	-	-
Unit-III: Applications of Opamp	2	1 either or	2(2) -CO3	-	1 either or (16) – CO3	-
Unit-IV: Special ICs	2	1 either or	2(2) - CO4	1 either or (16) – CO4	-	-
Unit-V: Application ICs	2	1 either or	2(2) -CO5	1 either or (16) – CO5	-	-
Total Qns.	10	5 either or	10(2)	4 either or (16)	1 either or (16)	-
Total Marks	20	80	20	64	16	-
Weightage	20 %	80%	20%	64%	16%	-

Weightage for COs					
	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Total Marks	20	20	20	20	20
Weightage	20%	20%	20%	20%	20%

EE22406	AC MACHINES LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To expose the students to find the performance of synchronous and asynchronous machines by doing experiments practically.

LIST OF EXPERIMENTS:

1.	Load test on three -phase induction motor.
2.	Load test on single -phase induction motor.
3.	No load and blocked rotor tests on three-phase induction motor (Determination of equivalent circuit parameters).
4.	Separation of No-load losses of three-phase induction motor.
5.	No load and blocked rotor test on single-phase induction motor.
6.	Voltage regulation of three phase alternators by EMF method.
7.	Voltage regulation of three phase alternators by MMF method.
8.	Voltage regulation of three phase alternators by ZPF methods.
9.	Voltage regulation of three phase salient pole alternator by slip test.
10.	V and Inverted V curves of Three Phase Synchronous Motor.
11.	Dismantle and assemble AC machines.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Determine the characteristics of AC motors by conducting load test.
CO2:	Determine the parameters of AC motors using no load and blocked rotor test.
CO3:	Pre-determine the voltage regulation of alternators.
CO4:	Determine the performance of synchronous motor.
CO5:	Demonstrate the AC machine by dismantling and assembling.

Course outcomes EE22406	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	-	-	-	-	-	-	-	-	-	-	2
CO2	3	3	1	1	-	-	-	-	-	-	-	-	-	-	2
CO3	3	3	1	1	-	-	-	-	-	-	-	-	-	-	2
CO4	3	3	1	1	-	-	-	-	-	-	-	-	-	-	2
CO5	3	3	1	1	-	-	-	-	-	-	-	-	-	-	2
CO	3	3	1	1	-	-	-	-	-	-	-	-	-	-	2

EE22407	CONTROL AND INSTRUMENTATION LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To provide knowledge on analysis and design of control system along with basics of Instrumentation
- To make the students familiarize various representations of systems.

•	To make the students analyze the stability of linear systems in time domain and frequency domain.
•	To make the students familiarize the characteristics of Sensors/Transducers.
•	To provide knowledge on AC and DC bridges.

LIST OF EXPERIMENTS:	
1.	Design and simulation of P, PI and PID controllers .
2.	Modeling of mechanical and electrical systems in simulation platforms.
3.	Design and simulation of Lag, Lead and Lag-Lead Compensators.
4.	Characteristics of SynchroTransmitter Receiver .
5.	Root Locus based stability analysis in simulation platform.
6.	Testing of controllability and Observability in continuous and discrete domain in simulation platform.
7.	Determination of unknown resistance,capacitance and inductance using bridges
8.	Performance characteristics of of Sensors/Transducers a. Temperature b. Pressure c. Displacement d. Optical e. Strain
9.	Measurement of Power and Energy .
10.	System identification through process reaction curve.
	TOTAL: 60 PERIODS

COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Analyze the stability of control systems
CO2:	Understand the dynamics of sensors and transducers
CO3:	Simulation of linear systems
CO4:	Determine the unknown values of passive components using bridges
CO5:	Design compensators based on time and frequency domain specifications.

Course outcomes EE22407	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	1	1	-	-	-	-	-	-	-	-	-	-	2
CO2	3	3	1	1	-	-	-	-	-	-	-	-	-	-	2
CO3	3	3	1	1	-	-	-	-	-	-	-	-	-	-	2
CO4	3	3	1	1	-	-	-	-	-	-	-	-	-	-	2
CO5	3	3	1	1	-	-	-	-	-	-	-	-	-	-	2
CO	3	3	1	1	-	-	-	-	-	-	-	-	-	-	2

SD22402	**CODING SKILLS AND SOFT SKILLS TRAINING – PHASE II**	**L**	**T**	**P**	**C**
		0	**0**	**4**	**2**
COURSE OBJECTIVES:					

• To help students on developing modular applications in using functions.		
• To help the students develop logics using Strings and Pointers.		
• To make them use user defined datatypes in C and help them know more about embedded systems programming		
• To train the students on speaking skills for group discussions.		
• To set them correctly on the track of presentation skills and management skills		
UNIT I	**FUNCTIONS**	**10**
Logic Building Using Functions – Programs on Recursion – Puzzles - Output of Programs - Company Specific Programming Examples		
UNIT II	**STRINGS AND POINTERS**	**10**
Logic Building Using Strings – Programs on Strings - Logic Building Using Pointers – User Defined Datatypes – Puzzles - Output of Programs - Company Specific Examples		
UNIT III	**USER DEFINED DATATYPES & C PROGRAMMING FOR EMBEDDED APPLICATIONS**	**10**
User Defined Datatypes: Working with User Defined Datatypes – Puzzles - Output of Programs - Company Specific Examples C Programming for Embedded Applications: Lookup Tables- Functions – LUT vs Function Example using Keil – Float Point Unit Example in Keil		
UNIT IV	**COMMUNICATION SKILLS / LANGUAGE SKILLS**	**15**
Receptive Skills and productive skills - Skills together - Integration of skills - Input and output Receptive Skills: Listening and Reading - Lead-in - Pre-existent knowledge - General understanding of the audio or the written text - Discussion in pairs or small groups – feedback - Text-related task in detail - Focus on aspects of language in the text. Productive Skills: Speaking and Writing - lead-in - engaging students with the topic - setting the task - role-play - Monitoring the task - Giving the feedback-positive- task-related follow up - repetition / re-setting of task. Activities: Pronunciation: syllable, stress, intonation - Writing memos, e-mails and formal letters - Oral presentations / seminars - Written and Oral Descriptions Group discussions.		
UNIT V	**SOFT SKILLS: SEARCH AND FIND FOR CAREER DEVELOPMENTS**	**15**
Self-motivation: Interpersonal relationship - Attitudes and interpersonal integrity – Time management – prioritizing - Leadership quality – In the team: Team building and Team work - Memory technique Problem solving: – emotional intelligence – positive attitude towards life – taking up initiatives – developing mind set –openness to feed back – adaptability – active listening – work ethics. Presentation of skills: creative thinking – critical thinking – logical thinking - decision making. Management ability: empathy – selflessness – humility – cultural respectfulness – versatility – generosity – trustworthiness – planning and executing – target achievement – listening to others' views – friendliness - active participation – empowering healthy atmosphere – exchange of ideas – mediation – negotiation – qualities – updating the knowledge – pre-work for performance – respect for rules and regulations		
TOTAL: 60 PERIODS		

Suggestive Assessment Methods:

1) Pre Assessment Test – To check the student's previous knowledge in Programming skills.

2) Internal Assessment I for coding skills will be conducted for 100 marks which are then calculated to 20.

3) Internal Assessment II for coding skills will be conducted for 100 marks which are then calculated to 20.

4) Model Exam for coding skills will be conducted for 100 marks which are then reduced to 20

5) A test for Communication skills will be conducted for 100 marks which will be then calculated to 40.

6) For assignments, students should attend all the practice tests conducted online on Hacker Rank. Each assignment will be for 100 marks and finally the total marks obtained by a student in all tests will be reduced to 40 marks.

7) The total of 100 marks obtained from the tests will be then reduced to 60 marks and additional of 40 marks will be given for assignments which will make it a total of 100.

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1:	Develop and implement modular applications in functions.
CO2:	Design and implement applications using strings and user defined data types.
CO3:	Design and implement embedded system applications.
CO4:	Practice both receptive skills (listening and reading) and productive skills (writing and speaking) and speak English with standard pronunciation using correct stress and intonation.
CO5:	Practice team building and team work procedures and develop memory techniques and Manage abilities like empathy, selflessness, cultural respectfulness and trustworthiness preparing themselves for target achievement.

TEXT BOOKS:

1.	Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2.	Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education, 2015.

REFERENCES:

1.	Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013.
2.	Paul Deitel and Harvey Deitel, "C How to Program with an Introduction to C++", Eighth edition, Pearson Education, 2018.
3.	E Balagurusamy, "Programming in ANSI C", Eighth edition, Mc GrawHill Publications, 2019.
4.	Andrew J Dubrin, 'Leadership – Research Findings' Houghton Mifflin Company, New York, 2008
5.	Elecia White, "Making Embedded Systems: Design Patterns for Great Software", O'Reilly Publications, 2011.

Course outcomes SD22402	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	1	1	1	-	-	-	1	2	-	-	-
CO2	3	2	2	-	1	1	1	-	-	-	1	2	-	-	-
CO3	3	2	2	-	1	1	1	-	-	-	1	2	1	2	-
CO4	-	-	-	-	-	-	-	1	2	3	-	2	-	-	-
CO5	-	-	-	-	-	-	-	1	2	3	-	2	-	-	-
CO	3	2	2	-	1	1	1	1	2	3	1	2	1	2	-

AC22401	**INDUSTRIAL SAFETY ENGINEERING**	**L**	**T**	**P**	**C**
		2	0	0	0

COURSE OBJECTIVES:

- Explaining the fundamental concept and principles of industrial safety
- Applying the principles of maintenance engineering.
- Analyzing the wear and its reduction.
- Evaluating faults in various tools, equipment and machines.
- Applying periodic maintenance procedures in preventive maintenance.

UNIT I	**INDUSTRIAL SAFETY**	**6**

Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

UNIT II	**MAINTENANCE ENGINEERING**	**6**

Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT III	**WEAR AND CORROSION AND THEIR PREVENTION**	**6**

Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT IV	**FAULT TRACING**	**6**

Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, i. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

UNIT V	**PERIODIC AND PREVENTIVE MAINTENANCE**	**6**

Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of

preventive maintenance. Steps/procedure for periodic and preventive maintenance of: i. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, Advantages of preventive maintenance. Repair cycle concept and importance.	
TOTAL: 30 PERIODS	
COURSE OUTCOMES:	
At the end of the course, the students will be able to:	
CO1:	Explain the fundamental concept and principles of industrial safety
CO2:	Apply the principles of maintenance engineering.
CO3:	Apply periodic maintenance procedures in preventive maintenance.
CO4:	Analyze the wear and its reduction.
CO5:	Evaluate faults in various tools, equipment and machines
TEXT BOOKS:	
1.	L M Deshmukh, Industrial Safety Management, Tata McGraw-Hill Education, 2005.
2.	Charles D. Reese, Occupational Health and Safety Management: A Practical Approach, CRC Press, 2003.
REFERENCES:	
1.	Edward Ghali, V. S. Sastri, M. Elboujdaini, Corrosion Prevention and Protection: Practical Solutions, John Wiley & Sons, 2007.
2.	Garg, HP, Maintenance Engineering, S. Chand Publishing.
3.	J Maiti, Pradip Kumar Ray, Industrial Safety Management: 21st Century Perspectives of Asia, Springer, 2017.
4.	R. Keith Mobley, Maintenance Fundamentals, Elsevier, 2011.
5.	W. E. Vesely, F. F. Goldberg, Fault Tree Handbook, Create space Independent Pub, 2014

Course outcomes AC22401	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	1	-	-	1	1	1	-	-	-	-	-	-	1
CO2	-	-	1	-	-	1	1	1	-	-	-	-	-	-	1
CO3	-	-	1	-	-	1	1	1	-	-	-	-	-	-	1
CO4	-	-	1	-	-	1	1	1	-	-	-	-	-	-	1
CO5	-	-	1	-	-	1	1	1	-	-	-	-	-	-	1
CO	-	-	1	-	-	1	1	1	-	-	-	-	-	-	1

HOD **ACADEMIC DEAN** **PRINCIPAL**